NATURE MAGAZINE

June–July, 1948 50 Cents Vol. 41, No. 6

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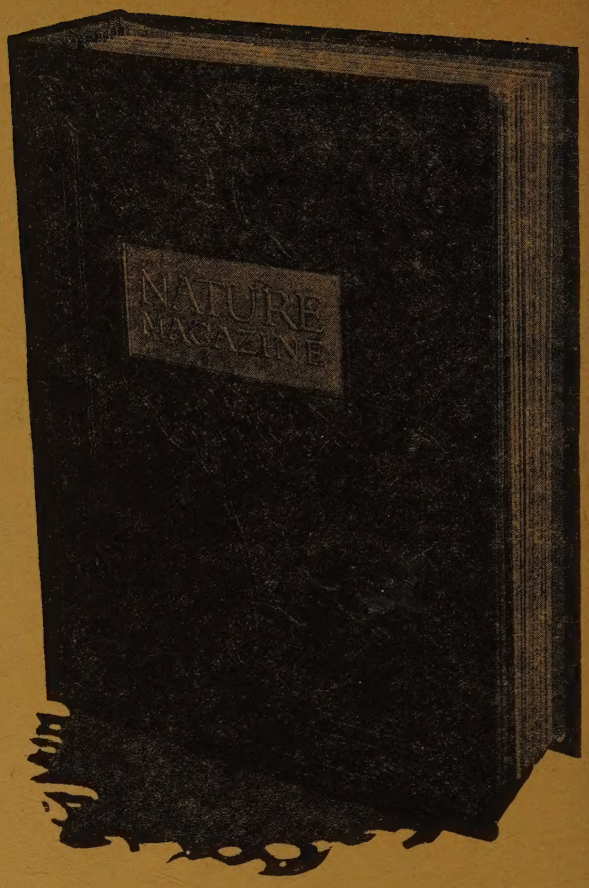

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Nature in Print

By HOWARD ZAHNISER

MOUNTAINS must always have had a profound influence on human beings, but it seems that, within historic times, as men's lives have become more urbanized, as their enjoyments and appreciations have become more highly "cultured," more sophisticated—less "natural," less simple—their devotion to mountains has become more intense. Mountaineering is more than a sport; it has a very real spiritual and esthetic aspect for many climbers. Mountains are more than stupendous features of the earth's always marvelous formations. They are not only now, as always, awe-inspiring, influences for humility, correctives to thoughtless arrogance. They also are challenges to exhilaration. They afford opportunities for conquest and accomplishment. They afford, too, a perspective, not only over their geographic surroundings but also over the mundane matters that obscure a different sort of vision. And in retrospect the mountain-top experiences are among those that make memory most precious.

Two recent volumes that are essentially personal narratives, yet also descriptions of mountains, are as good reading as anyone might wish for, to tell him what mountaineering is and to let him understand why mountains mean so much to so many. Both, it is curious to note—and surely highly significant too—were written in prison camps during World War II.

"The blurred first weeks of 1942," writes Scott Russell in *Mountain Prospect*, "brought Singapore to its fall and us of its armies to the strange half-living of prisoners of war. For the body there was no escape; for the mind only that which each could make for himself . . . my instinctive reaction was to write, and I began this book as soon as I could find paper . . ."

Geoffrey Winthrop Young comments in a foreword that "this is the first case I have known when a young man has set himself deliberately to call up such memories, as a means of keeping his sanity and of excluding for long days and even years the consciousness of oppression and bodily discomfort."

Yet at about the same time W. H. Murray was writing *Mountaineering in Scotland* from behind barbed wire—"with no dark design of enlightening others, but," he says, "because I could not help myself."

"In three years of squalor," writes Mr. Murray, "in overcrowded prison camps, where misery gnawed at men's fortitude, these stored memories heartened me like 'a light for memory to turn to when it wants a beam upon its face'; and youth, somewhat crushed in warfare, revived hope for the future from inexhaustible mountain springs. That through mountains I have been given not only vivid memories but lasting joys and friendships more priceless than accumulations of gold is no idle theory invented in credulous days of comfort and security, but a sure knowledge won in adversity."

These testimonies and explanations Mr. Murray makes in a remarkably expressive final chapter of *Mountaineering in Scotland*. The body of the book itself is devoted to narratives of specific experiences on the most exciting of the "two hundred and seventy-six mountains in Scotland." In a concluding chapter, however, entitled "Rocks and Realities," Mr. Murray writes in general terms, somewhat philosophically, an interpretation for those who wonder why mountain climbers do those things. Those who wonder, for example, why climbers are so "reckless," will be interested to read—

"My conclusion is that for a well-trained climber acting within his powers, which is simply common sense, there is little danger in Scottish mountaineering. Everywhere, however, there is the appearance of danger. He is indeed an unimaginative man who, upon the last pitch of Crowberry gully, can look a thousand feet down the snow-caked walls and not think what would happen if he let go. His finger, thereupon, tightens on its ice-notch, for there is no doubt that he loves life. Notwithstanding, he has come to one place where vigorous elasticity of nerve and precision of movement are required to preserve life. It is plain that if he loves life he still more loves living—otherwise he would keep to a steam-heated room, eat to diet, and at measured intervals perform physical jerks to forestall the atrophy of his precious limbs. The joy of life will never be measured in terms of comfort and security, nor will the debased currency of the latter buy a true friend. Let us admit, therefore, that together with many another important element, seeming danger ensures that on mountains, more than elsewhere, life may be lived at the full."

Mr. Murray remarks at the close of one excursion: "We had set out in search of adventure; and we had found beauty." The comment would seem to apply to all of his mountaineering career, which again and again seems to be essentially a cultural avocation. An assembly of the expressions of beauty in *Mountaineering in Scotland* shows a variety of fine perceptions, and two pages from its end Mr. Murray says: "It has been my endeavour to say by what many roads, at unexpected moments in mountain days, one may win fleeting glimpses of that beauty which all men who have known it have been compelled to call truth."

Scott Russell in his *Mountain Prospect* looks back over a wider variety of ranges, from a somewhat different viewpoint. Yet if he and Mr. Murray had found themselves in the same prison camp they would surely have been happy even there. Even their differences are similar. Mr. Russell, for example, says that danger is always present among mountains, but he hastens to add that accidents become frequent only when ignorance or recklessness leads to a disregard of the principles of the art of mountaineering. "Holiday motoring in England," he says, "probably kills a larger percentage of its devotees." In his esthetics Mr. Russell seems to emphasize spiritual companionship with other men, yet he would doubtless be among the most understanding readers of Mr. Murray's comments on beauty, while Mr. Murray would know deeply what Mr. Russell means when he writes:

"The intangible bond between climbers is signified by the tangible link of the rope joining their bodies; its proper use as a physical safeguard is a large part of their art but its psychological significance is even greater. The climber has a dual existence; as well as an independent individual he is, for the duration of his climb, part of a larger organism which exceeds the sum of its components both in physical and mental capability. . . . Of all the gifts of fortune which enabled me to become a mountaineer my climbing companionships have been the greatest."

Night Visitor

By LEONA AMES HILL

There was a little owl that flew one night
Against the window where a bright lamp gleamed,
And clinging to the ledge there in the light,
He gazed with somber eyes that somehow seemed
To question the strange folk who choose to dwell
Hemmed in by walls within a lighted house,
When out of doors night weaves a magic spell
Where silver rabbits run and every mouse
Goes forth all satin shod among the grasses,
And little foxes with their silent feet
Run in the wood, while in the deep morasses
Of fern and alder thickets come the notes
Of husky whip-poor-wills that wrap the sweet
Cool darkness velvet soft about their throats.

Mr. Murray is an inspired amateur. Mr. Russell's mountaineering has for him a professional significance, for in his university days he made botany his major subject. He explains: "Work and recreation could, I felt, harmonize—the combination of my interests, botanical and mountaineering, should in the future yield more than either if separately pursued." Undoubtedly Mr. Russell has often congratulated himself for his decision, while doubtlessly Mr. Murray is well satisfied that he leaves behind all professional concern when he goes to the mountains.

These two books together provide a most unusual opportunity to appreciate fully and nicely, through reading, the essence of mountaineering. There are also geographical advantages in their perusal, and in surveying their remarkable assemblies of magnificent photographs. One feels almost as if he has climbed in person Mr. Murray's Scottish mountains, the New Zealand Alps where the young Scott Russell learned his devotion, and the widely separated ranges where he later explored. On excursions from his Kensington laboratory he visited the British hills and explored the "old" mountains of the European Alps. He once spent a summer in the Arctic and there on the island Jan Mayen climbed Beerenberg—a great, snow-covered, extinct volcano, which at that high latitude rises 7680 feet above sea level. When war distorted his life, as it has so many, he was in the Karakoram-Himalaya. As all this was there ending, the summons to war having been received, Mr. Russell in his sleeping-bag, one night, cast his mind back through the years and saw, as is possible only on such occasions, the essence of a mountaineer's wealth.

"It had been my good fortune," he writes, in recording this revery, "to know widely varied types of mountains. The contrast of scenery had been fascinating, so also had been the human contrasts. In New Zealand mountaineering had still been at a comparatively early stage; in Switzerland and among the British hills it had attained its most specialized development; in the Himalaya a new era of exploration was still beginning. In each region the methods by which we approached the mountains had been different; but they were not unconnected. The essence of experience had always been the same. In our bodies we had known the forces which from the dawn of time controlled the life and happiness of man: hunger and cold; heat and fatigue; storm and the fury of wind; danger and fear; friendship and beauty so pure that we could scarcely believe it real, and contentment which it seemed the earth shared with us. We had gained also some understanding of the configuration of the earth's surface, of the forces which had moulded it, and of the way in which these things controlled man's life and free movement. This is no profound knowledge, and we gained it with no particular display of skill. But it added to the horizon of our minds, developing in some degree a geographical outlook, geographical not in the old-fashioned schoolroom sense, but in its real meaning of pertaining to the earth's surface and all that lives upon it. As a scientist I felt I had gained a particular benefit, for I had been led away from those comfortable specialized grooves in which, at other times, it is so easy to confine one's interests. Climatology, geology, the elementary economics of living, had obtruded themselves into every investigation. These things had surely made us of better judgment, and saner, than otherwise we might have been, and humbler too, for conceits and ambitions tend to wilt in the shadow of great hills."

Mountaineering in Scotland. By W. H. Murray. London: J. M. Dent and Sons Ltd. 1947. 252 pp., with 32 full-page photographs, 2 diagrams, 3 maps, and index. $4.50. (Importations Department, The Macmillan Co., 60 Fifth Ave., New York.)

Mountain Prospect. By Scott Russell. London: Chatto and Winders. 1946. 248 pp., with foreword by Geoffrey Winthrop Young, 60 photographs on 47 plates, 7 sketch maps, and index. $5. (Importations Department, The Macmillan Co., New York.)

Shell Guide

A Field Guide to the Shells of Our Atlantic and Gulf Coasts. By Percy A. Morris. Boston. 1948. Houghton Mifflin Company. 190 pages. Illustrated in color and black and white. $3.50.

This is the second volume in Roger Tory Peterson's Field Guide Series, of which Roger's fine *Field Guide to the Birds* is the foundation volume. This is a handbook for the identification of the marine snails and bivalves found along our Atlantic Coast from Labrador to Texas. It is a much-needed popular guide, the easily usable text combined with excellent pictures. The author is chief preparator at the Peabody Museum of Natural History of Yale University and president of the New Haven Conchological Club. This is his second shell book.

Thomas A. Edison

The Diary and Sundry Observations of Thomas A. Edison. Edited by Dagobert D. Runes. New York. 1948. Philosophical Library. 247 pages. Illustrated. $4.75.

Thomas A. Edison did not leave behind much more than a fragmentary diary, and observations and notes. Yet these are revealing of the probing, imaginative mind of the man whose contributions were tremendous. The editor has sought particularly to present Edison's social and philosophic ideas as revealed by this material.

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Riding the Trail

Nine expeditions into wilderness areas of the West will be conducted this year by the American Forestry Association, 919 17th Street, N. W., Washington 6, D. C. These will be carried on by Trail Riders of the Wilderness, a non-profit organization set up by the Association as one of its educational activities. The trips vary from one to two weeks in length. Full details will be sent on request.

Huckleberry Mountain

Rather tardily there comes to hand announcement of the three-week course in Nature and Nature appreciation offered at Huckleberry Mountain Workshop-Camp, Hendersonville, North Carolina. The course, which will run from June 28 to July 16, is conducted by Mabel T. Rogers. Full information about this session, and other summer work offered at Huckleberry, may be obtained from Evelyn G. Haynes at the address given above.

Sorry, Mr. Caroline!

It appears that we were unjust to Mr. Milton Caroline of the U. S. Fish and Wildlife Service in the brief note carried on Page 175 of the April, 1948, issue of *Nature Magazine*. This observation related to the control of certain insects by eliminating their animal vectors as reported in the Proceedings of the Indiana Academy of Sciences. Being sensitive in the matter of "control" programs, we appear to have read more into this than existed. Mr. Caroline's remarks were severely abstracted by another, and published without the speaker having an opportunity to see them; and the inclusion of the word "eliminate" was not his. He was referring to control of sparrows, pigeons and starlings, as well as rodents, as insect vectors. He made no formal presentation but contributed his views at a symposium.

New Telescope

Revolutionary in design, and containing several new features, is the new Mark 245 telescope, which is applicable to Nature study, bird observation, astronomy and other uses. This instrument has interchangeable eyepieces, which afford selective optical power for every user and every use. Eyepieces of 10, 20, 30 and 40 power are available. This is said to be the first prismatic telescope with the eyepiece set at a 45-degree angle. It also has a positive internal focusing ring, which provides instant critical focusing. If you will mention *Nature Magazine*, full details will be forthcoming from Davidson Manufacturing Company, 5146 Alhambra Avenue, Los Angeles 32, California.

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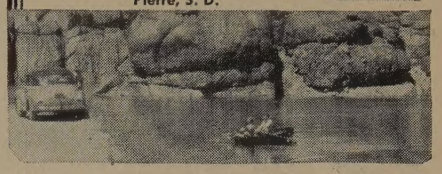

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History of Science

Introduction to the History of Science. By George Sarton. Baltimore, Maryland. 1948. Published for the Carnegie Institution of Washington by Williams and Wilkins. Vol. III; in two parts. Part I, 1018 pages; Part II, 2155 pages. Illustrated. $20.00 the set.

This is a monumental work of almost frightening historical and scientific, not to mention physical proportions—frightening, at least, in proportion to space available for review. And when one considers that these two volumes, comprising, together with indexes, more than three thousand pages, deal only with the fourteenth century, the reviewer inevitably resigns himself merely to calling to the reader's attention the appearance of this work. The first volume was published in 1927, and, with Volume II, brings the history down to the dawn of the fourteenth century. All together constitute a work of tremendous reference value; one that must, of course, find its place in any properly constituted scientific library, or adequate public library. Yet beyond the reference value lies the interesting and readable prose of the author, spiced here and there with humor, with interesting objective comment, with philosophical asides. His preface to Volume III is worthy of special reading, as is his introductory chapter, since they serve to relate world events to the early progress of science. No such work as this could, of course, have come forth other than with the sponsorship of such an agency as the Carnegie Institute of Washington, to which, together with Dr. Sarton, we are indebted for a significant contribution to scientific literature.

Superstitions

A Treasury of American Superstitions. By Claudia de Lys. New York. 1948. Philosophical Library. 494 pages. $5.00.

If you wish to know why orange blossoms are associated with bridal wreaths, why the owl is both bird of wisdom and doom, why porcupines never seem to live down the idea that they "shoot" their quills, you will find the answers in this book. A wide variety of superstitions is covered, the origins of these beliefs described and the fallacies pointed out. It is an interesting book to pick up and read a few pages, or to read at length. It contains many surprising things.

New Insecticide

From the Du Pont Company comes news of a new insecticide called "Marlate" that is said to combine high efficiency, low toxicity to warm-blooded animals and safety on plants. Tests have shown that it can be used safely on livestock and on crops, and that it has a fast "knock-down" action against nuisance insects like flies and mosquitoes.

Contents Noted

"IT HAS been my experience that people who like to hit the trail are invariably interested in wildlife," writes Milton Hildebrand in the opening sentence of an article on wildlife conservation in the March, 1948, issue of *Sierra Club Bulletin*. We fear that Mr. Hildebrand is judging by the conservation-minded membership of the Sierra Club, one of our outstanding conservation organizations. Our experience has been quite the opposite. For some years we published a hiking and camping section in *Nature Magazine*. It was our thought that organized hikers represented a large group with an aroused Nature interest; constituted a potential reservoir for conservation action. After this department had had ample time to "take," we sent out a personal inquiry to the presidents of some seventy-five established hiking groups. One question we asked was the extent of Nature and conservation interest among the members of his group. One-third of those addressed took the trouble to answer, and, without exception, all replying described such interests as minor or non-existent. Association with other people, healthful exercise and hiking records in miles were more important. We do not understand it, but that is what we discovered.

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FROM a member of the staff of *The Rotarian* comes a note sending us, pridefully, a tear sheet of an article by Ben East entitled "Kill that Crow!" We were invited to reprint the article, in whole or in part. Time was when Ben was a pretty good conservationist, although he may always have been agin' crows, and subscribed to the anti-crow propaganda without concern for the other side of the story. That this is the case is suggested by the fact that Ben recites the false assertion that the crow is found as far North as timber grows, a bit of misinformation often cited by duck hunters to explain the decline in duck numbers. However, the main object of Ben's article is quite obvious from the sentence: "He (the crow) provides excellent sport for Northern hunters at seasons when no other legal game is available." In order to justify going afield with a gun it has been a practice of gunners and gunners' publications to paint the crow as black as its feathers. The type of gunner who *must* find something to shoot at all the year round cares little what he kills, and crow shooting has a sad by-product in casual slaughter of other birds.

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VIOLENTLY the billboard companies deny that a billboard can be a safety hazard by distracting the attention of the motorist. We disagree, and, in so doing, are happy to quote from the 1948 legislative program of the New York State Automobile Association, a program designed "to make your motoring safer, more pleasant and less costly." One section of this program states: "The unsightly appearance of the roadsides along the country's principal highways is cause for a growing national concern. Today, these roadsides are becoming increasingly characterized by unattractive roadside advertising displays and shacks. This concern is not only due to the despoiling of natural scenic beauty but to the fact that unregulated roadside commercialization *constitutes a significant traffic hazard*. A highway which is wide enough through purely agricultural or forest land may become congested to the point of inconvenience and danger when roadside business crowds into it. The danger is *accentuated by the distraction of the motorists' attention by displays of roadside advertising*, which compete with the roadway for attention." The italics are ours.

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O. S. BEACH is a Mariposa, California, cattleman who is fed up with law-breaking gunners. So he posted notices on his ranch reading: "Hunters have been running roughshod over our property, paying no attention to our No Hunting signs or destroying them, leaving our gates open, breaking our fences down, shooting deer out of season by day, and also by spot and head lights by night. . . . We will pay $100 reward for information leading to arrest and conviction of anyone seen hunting, trespassing, destroying our No Hunting or Trespassing signs, leaving our gates open, or breaking our fences. We will further pay $200 reward for information leading to arrest and conviction of anyone shooting deer on our property in or out of season, and will boost the reward to $250 for anyone caught night shooting out of season." When we quote items like this we are promptly accused of being anti-gunner and prohibitionists, as well as unfair to the better type of sportsman. We have no special quarrel with those who go afield and respect both the gunning laws and the rights of private property, but we still contend that they constitute the minority among those who take out a hunting license each year. There is something about putting a gun in a man's hands that makes a great many feel superior to any law—gives them a gangster complex.

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WE ARE surprised to learn that, in the face of nationwide condemnation, and harsh criticism from the newspapers and people in neighboring States, the emphatic disapproval of organized archers, and even local distaste, the Rawlins, Wyoming, Chamber of Commerce plans to repeat the vicious bow-and-arrow buffalo kill that was a bloody exhibit last year. Apparently the idea is that publicity is all that is desired, even though it is bad. R. W. W.

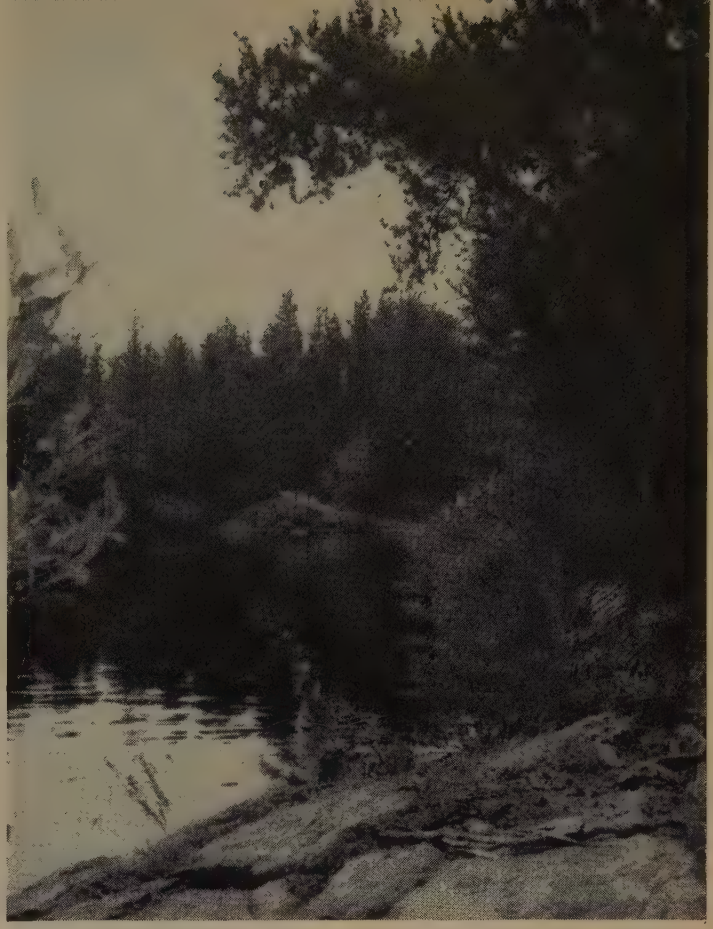
U. S. FOREST SERVICE PHOTOGRAPH

This is the south shore of Lac La Croix in Superior National Forest, showing the islands and waterways of the untouched wilderness of this glorious country. But, at the bottom of the opposite page, we see what happens when resort and private road developments appear. This is a scene at Prairie Portage on the east inlet of Basswood Lake.

Cheering news comes from Canada to those interested in the future of the Quetico-Superior region. Premier Drew of Ontario is a champion of conservation, and his Department of Lands and Forests proposes a program that will protect shorelines, islands and portages in Canada. The days of cut and slash are over. Ontario will give recreation high priority. And if the Blatnik Bill in our own Congress can get a final approval we can hope for—

"Voyageur's Return"

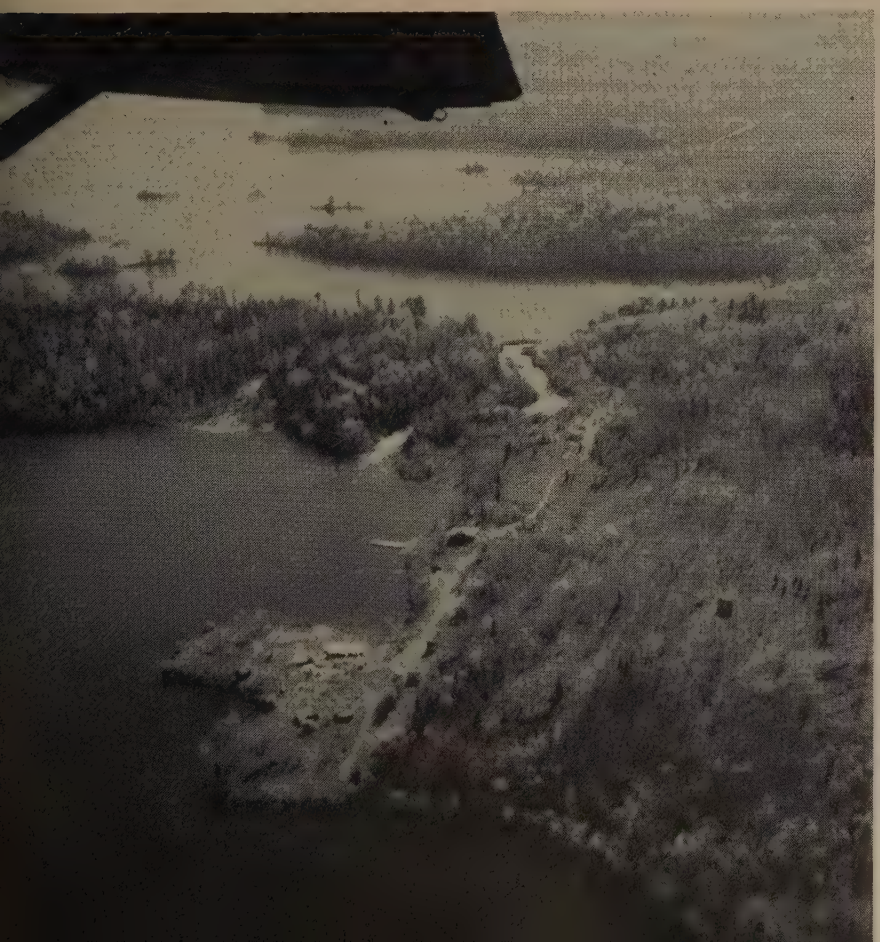
By SIG OLSON



A typical sheltered bay on a lake in the Quetico-Superior country.

USUALLY when, after a long interval, a man revisits an area much dreamed about and loved, he is disillusioned. Boyhood rivers become little creeks; deep swimming holes change to shallow pools; mighty forests shrink into brushy woodlots. Even magnificent and soul-stirring adventures have a habit of turning into ordinary incidents.

But last year when I revisited the wilderness lake country of the Quetico-Superior, I found this was not true; that, although places might have changed physically, their real meaning was more important than ever before. Why the old formula did not apply here is clear to me now. It is all tied up with those first vivid perceptions, and a quarter of a century of growing appreciation of the part wilderness plays in our lives.



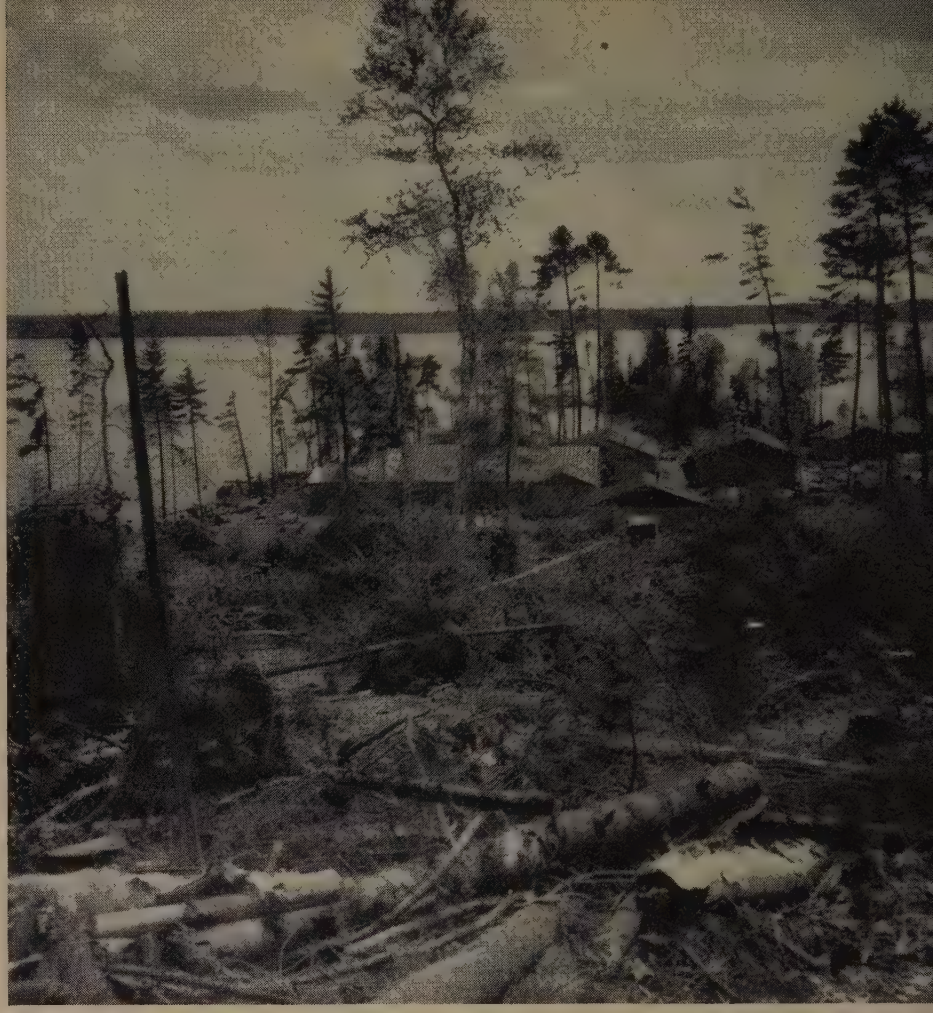
When I first came to the Minnesota-Ontario border country, it was wild and unknown, and all roads stopped long before they reached its borders. It was possible to put in with a canoe at some little frontier town and travel for weeks without seeing a soul. It was a paradise for a young man with a trace of pioneering blood in his veins. I approached that country with a feeling of awe. The opportunity of exploration, of camping where men had never camped before, of being on my own in a great wilderness was a tremendous experience.

For years, I had heard of this great lakeland, of its thousands of miles of canoe routes interlacing both sides of the border. I knew that these waters of the Rainy Lake watershed extended clear from Lake of the Woods to Lake Superior. A trapper had told me that of all the lake country of the north this was by far the best, that because of its short portages, its winding, broken bodies of water, its great pines and beau-

tiful campsites there was nothing like it between the border and Hudson Bay. I knew that on the American side was the newly created Superior National Forest, and, on the Canadian, the Quetico Provincial Park of Canada; that, although the area was split by the international boundary line, it was in reality a great geographical unit of closely connected lakes and rivers.

I had heard of the fishing, of the bass, and trout, and pike that were found in all those lakes; of the moose, deer, and even caribou farther to the north. But what appealed more than anything else was the fact that it was still wild and unspoiled. As though in proof, my first charts showed enormous blanks that had never been explored. This was a country where a man could lose himself and all the rest of the world.

Previous to my coming, I had read the story of the voyageurs, those red-capped wilderness travelers of the old fur companies. I had become familiar with the early explorers — Alexander Mackenzie, Verendrye, Radisson and Groseillers. Names of the lakes and portages captured my imagination—Lac La Croix, Deau Riviere, Saganaga, and Kahnipiminanikok. I knew that when I entered the fastnesses of the Quetico-Superior I would become a part of all that. It would be like lifting the curtain on another world. No longer would I belong to the twentieth century. I would be a voyageur of the seventeenth, a man from Trois Riviere or Montreal. I would see the country through his eyes.

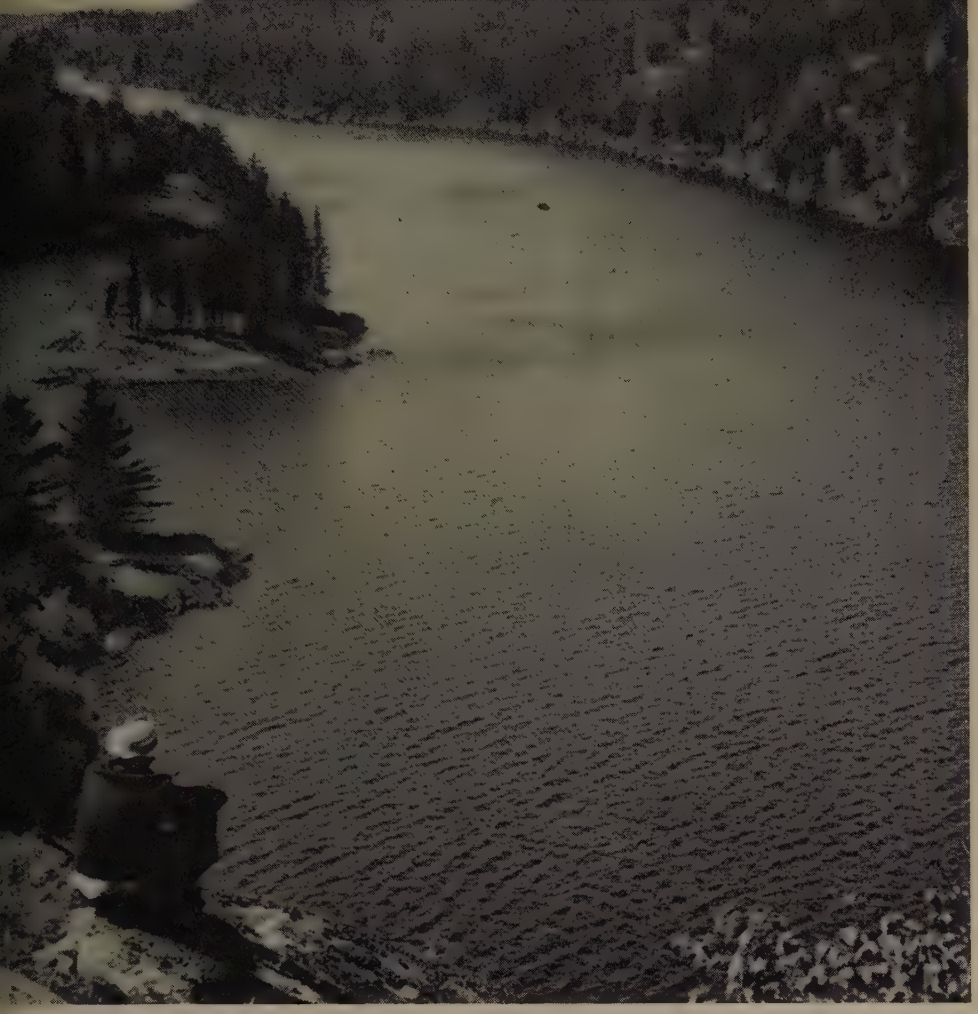


What happens when unrestricted logging takes place in the Quetico-Superior wilderness. While this devastation is not yet general, it can be, without protection. Below, the cliff of the Painted Rocks at Lac La Croix, international boundary.

U. S. FOREST SERVICE PHOTOGRAPH

Since those first exciting trips, I have traveled thousands of miles by canoe, have learned to know that country as only a country can be known by those who paddle and pack through it and sleep on the ground. As a wilderness guide, I cruised its waterways with hundreds of people from all over the United States. I saw what it meant to them, and became sold on the importance of preserving a wilderness way of life.

I had also watched, over the years, the running fight to preserve this wilderness lakeland. I had seen victories and defeats, had watched some of the most important areas lose their character and go down before the onslaught of commercial exploiters. I had



not been overrated; had not during the years become insignificant and small. I felt I must know, and others must know, if we were to carry our battle for the restoration of the area to a successful conclusion.

The first place I decided to see was Knife Lake. Just twenty-eight years ago, I had camped on a little island facing the peninsula that divides that great waterway into North and South Arms. It was a tiny spot on a bold rock twenty feet above the water. From this vantage point one could see the rugged islands and the vast sweep of water to the east. It was calm that first evening, and the waters were colored from the sunset. That whole expanse of wilderness water was ours. Because it was early June, the white-throats were singing, and from the dark mass of timber on the Canadian side came the violin notes of the hermit thrushes. Loons called from the open lakes and echoes came back from over the ridges. From the dusk overhead came the sound of

This is Crooked Lake in the Quetico-Superior area, while below is a bit of the gorge of the Temperance River near Lake Superior in Superior National Forest. U. S. Forest Service Photos.

seen the steady growth of national interest in the region and its problems, and out of it come the great plan to create an International Peace Memorial Forest. I had watched organizations like the American and Canadian Legion, the Izaak Walton League of America, the Quetico-Superior Council pledge their support. But, since the war, I had seen with dismay the influx of planes, the mushrooming of resorts on private lands within the borders of the roadless areas, and the swift dissipating of the wilderness. I had come to realize that, in spite of the interest of the American public in the preservation of this lakeland, the time was growing short; that, unless something was done soon, the land of the voyageurs, as I knew it, would be lost forever.

With these thoughts in mind, I decided to revisit three particular areas last year, places that had loomed large on my first trips to the Quetico-Superior. Although I knew they had changed, I wanted to see them again and relive those first vivid impressions. I felt I must know if they had changed irreparably; that, should the dream of an International Forest come true, they could be restored to their original primitive status, so that the voyageurs of the future could see them as I saw them when I first went in. I wanted to be sure that youthful impressions had

Taking the canoes from the water at Roland Lake Portage to Curtain Falls. Below, loaded down with canoes and gear on the portage to Curtain Falls.

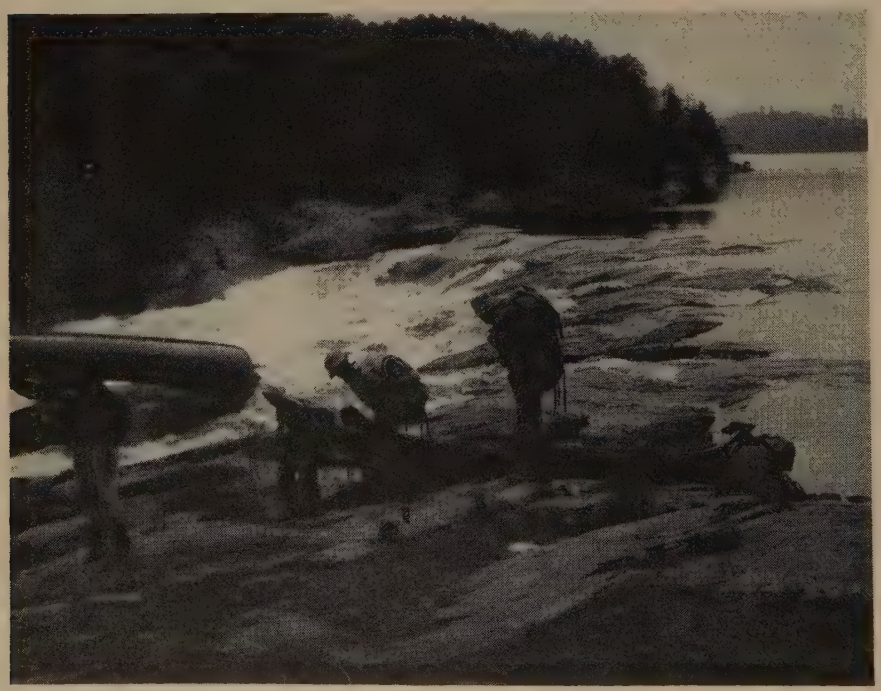
softly beating wings. Over in a near bay, a moose sloshed around in the shallows. It was unutterably peaceful, quiet and immense, with no sounds but the sounds of the wild.

The following morning we pushed down the island-dotted channels of Knife into a tiny creek on the way to Ottertrack Lake. It was there we entered Paradise Harbor, a round little bay completely encircled by tall pines. Not a stick was out of place there, not a tree down or a rock disfigured—one of those places where you feel as though time had stopped. It was there I understood, for the first time, the real meaning of wilderness. That morning my voyageur spirit soared.

Last June, I camped again on the same little island in Knife. The campsite was just as beautiful and the timber on both American and Canadian shores looked, if anything, denser and darker than before. The vista down the lake to the east gave me the same feeling of immensity and space I had known before. The hermits and the white-throats were singing and the loons calling out on the open water. I thought to myself: "It is the same, it hasn't changed." But there was a difference, for an airplane fishing camp had been established on Knife in recent years. Even though I had seen no motor boats and had heard no planes when I came in, I knew they were there. The wilderness had changed. No longer did it belong to the voyageurs.

The following morning, I paddled into Paradise Harbor. The little creek had been "improved" to permit the entrance of larger craft. The timber had been severely burned on the American side, and the duff and rocks beneath the pines that had stood so tall and clean before were now littered with refuse. Paradise Harbor—the name seemed a mockery now. I stood there for a moment trying to recapture the feeling of perfection of that morning twenty-eight years ago, but found it was impossible. The old dream was gone, but not the meaning or the importance of the place.

I knew that, if this resort were removed, Knife Lake would swiftly return to the old wilderness I had known; that, given time and protection, those desecrated shores at Paradise Harbor would again have tall pines and clean, unlittered duff. Voyageurs of the future could see and enjoy what I had seen. Standing there, remembering, the ideal of The International Peace Memorial Forest became a shining challenge to the wilderness canoe men of today.



The second area was on the western boundary route. Long ago, a Canadian ranger had whispered of a lake that was full of bass. No, he did not know exactly where it was, but there was a portage, he said, just a faint one, a couple of miles above Table Rock on the Canadian side of Crooked Lake. And this he did know, that it had clear water, it was beautiful, and

Hundreds of wooded islands dot the Lac La Croix country. This is an air view of the mid section of the west end of this island country.

full of four- and five-pound fish that had never seen a lure.

After exploring the timbered, glaciated shores of Crooked Lake, we found that little portage. It started at a deer-tracked strip of golden, sandy beach, wound along a tiny creek, and came out on a stretch of boulder-strewn, rocky shore. Great windfalls lay out into the clear water, and there were patches of rushes and lily pads in the near bays. It was perfect bass water, but still we were not sure. I caught a green frog and tossed it out, watched as it lay belly down on the surface. Then the water boiled, a broad green side showed through the swirl and the frog disappeared.

Excitedly we portaged the outfit to the shores of the new lake and pushed down to an island in the north end. The island was covered with a growth of pine and spruce and overlain with a deep cushion of duff and caribou moss. On the south side was a smooth, rocky shelf flush with the water. It was there we decided to camp. For a full glorious week, we stayed on Bart, explored every bit of shoreline, fished off great beaver houses, reed beds, and countless windfalls, caught four- and five-pound bass on barbless flies, until we were tired of releasing them. At night we sat on our little campsite and listened to the loons and watched the widening circles as bass came up to feed. It was wilderness fishing as men dream about but seldom find.

Last year, I returned to Bart. I had heard what had happened but wanted to go there again for a final visit to settle, in my own mind, the question I had raised. At the little sand beach were three flat-bottomed boats. Empty oil drums were strewn along the shore, and the faint trace of a woods trail that had been the portage was now a muddy morass of tracks. At the other end were more boats and a big dock, a live box, a minnow trap, all the accoutrements of a private resort lake. A new establishment some ten miles away, on Friday Bay (Continued on page 330)

From Ed Teale's Insect Garden has come rich material for such notable books as GRASSROOT JUNGLES and NEAR HORIZONS, as well as both still and motion pictures and an insect lecture. In October, Dodd, Mead will publish still another volume inspired by this garden—DAYS WITHOUT TIME. We will publish three of the chapters of this book, the first of which is—

A Clump of Grass

By EDWIN WAY TEALE

Photographs by the Author

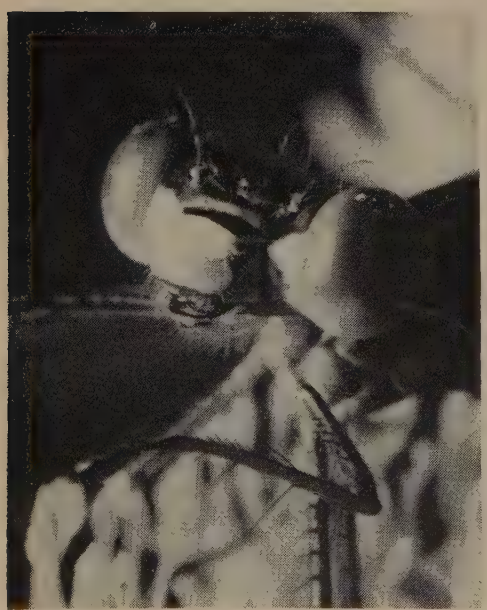
In morning mist, the grassclump looks like a puff of greenish smoke. In noon sunshine, it suggests a feathery fountain, rising as high as my chest. But most often, as I pause beside it, I am reminded of an island, a bright green island that lifts above the running tide of the swamp vegetation.

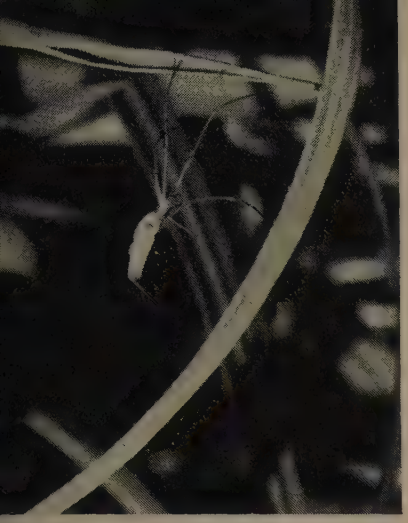
Like an island, the grassclump has its fauna; its inhabitants, transient and permanent. It has its diurnal and its nocturnal life. It even has its miniature migrations up and down the multitude of stems that descend, like supporting columns of coral, to the sea-bottom of the swamp. To scientists, this lowland tussock is *Glyceria striata.* To me, it is a kind of Avalon of the insects, a legendary isle "where falls not hail, or rain, or any snow, nor ever wind blows loudly." Come with me to the grassclump.

A thousand times a year, in summer sunshine, I pause beside this island in the air at the foot of my Insect Garden hillside. This year, 244 stalks, each nearly 500 times as high as it is thick, each ending in a lacy spray at the top, make up the grassclump. The bottom of the tussock is eighteen inches thick. It rises four and a half feet above its roots. Its billowing, feathery top has a diameter of three and a half feet. Such are the dimensions and characteristics of this swamp-side clump of grass that, for more than half a dozen years, has been a feature of my landscape.

This morning, the light within the clump is green and restful. The rays of the July sun penetrate it as though entering a forest of bamboo. Shadows of stems run along other stems. In this peaceful setting,

Above, the clump of grass at the beginning of a new season and before it has become host to such striking creatures as are shown below, left to right. These are the face of a damselfly, of course greatly enlarged; the magnified face of the transient green grasshopper; the enlarged close-up of a black field cricket, common in the clump in late summer.





Another tenant of the grassclump was a slender, yellow grass-spider. It was such a one that had the pollen on its back. Next, the foam mass left by a frog-hopper on one of the grass-stems. And, amid the stems of grass, a grasshopper.

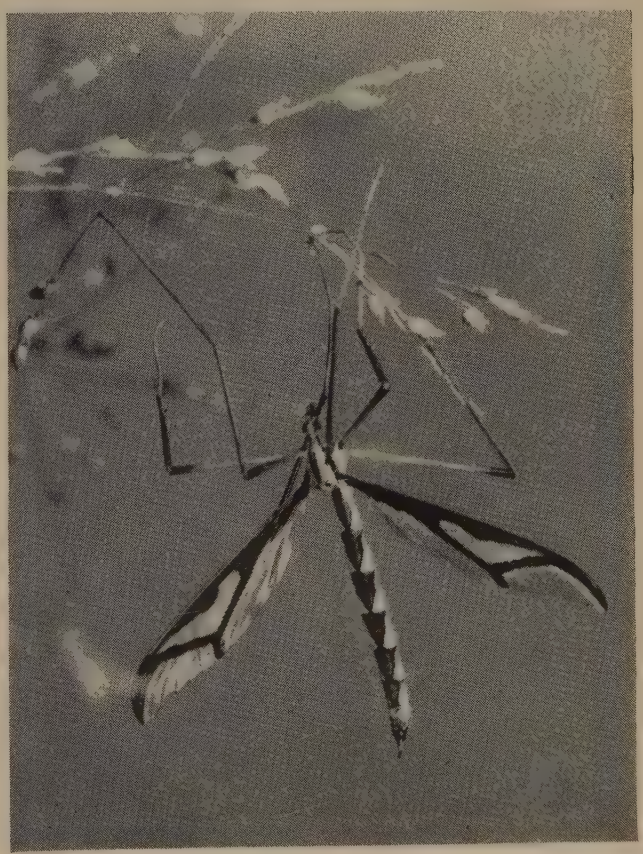
I have been watching a baby grasshopper, honey-yellow, with an abnormally large head and a body no more than three-eighths of an inch from tip to tip. At intervals, its little jumping legs straighten out. Its tiny body catapults through the air fully an inch and a quarter. It alights on the side of another stem. Above it and below it extend a multitude of green columns. Here, surrounded by food, sheltered from the breeze, shaded from the violence of the sun, the baby grasshopper seems living such a life as led Anacreon, 2500 years ago in Greece, to set down the words: "Happy insect! What can be in happiness compared to thee?"

I wished mightily that, for a sunny hour, I might trade places with this gay little grasshopper in the pleasant world of a grassclump. For neighbors there I would have the tan cranefly blundering through the maze of the grass-stems, the brilliant blue damsel-fly drifting silently like a colored needle weaving among green threads, the peaceful little sap-drinking frog-hoppers, whose pea-sized masses of froth are scattered about the clump like white flowers strewn among the stems.

This imaginary journey ended suddenly. My eyes caught sight of something red—deep, rich red—among the green stems at the farther side of the grassclump. A moment later, I was bending close to examine the largest insect I ever encountered there. It was a great, nocturnal, Cecropia moth with a wingspread of nearly half a foot. With its wings folded together, its fern-antennae bent forward, its widespread feet anchored in the grass-stems, the moth was unaware of what was going on around it. It was sound asleep.

Many insects choose the tussock for their sleeping quarters just as, in fall, small creeping creatures descend among its roots for the long sleep of winter hibernation. Sometimes, at dawn, I come upon half a dozen damselflies clinging motionless and asleep, looking like hair decorations in the fluffy head of the grassclump. I remember once discovering a black ant that had slept away from home. Its back was covered with minute drops of dew that glittered in the pale dawn-light. I tapped the ant with the tip of a grassblade. It started awake on the third tap. Then, like a small boy aroused from deep slumber, it stretched and even opened its jaws in a long yawn. Then it ran down the grass-stem and disappeared.

Anyone who observes the sleeping habits of even the commonest insects encounters surprising things.



A cranefly dangles from the end of the seed-laden head of a stalk of grass in the clump.

Imagine yourself in a world where horses sank their teeth into tree-trunks, stretched out their bodies stiff and straight, almost at right angles to the trees, and went to sleep with nothing under them except thin air! Imagine yourself where cats and dogs dug their claws into tree-limbs and, hanging upside down, fell asleep for the night! Such a world, strange as it would be, is hardly stranger than the realm of the sleeping insects.

What might be described as the counterpart of the horse, I have observed at this very clump of grass. There, one morning, I came upon a small, dark wasp. It had clamped its jaws on one of the stems at the edge of the tussock. Then, with its feet hanging, supported solely by its mandibles, the insect had slept the night away. Other wasps, like most of the insects, hang themselves up on hooks for the night. They engage the sharp double-claws at the ends of their feet in some support and then, anchored firmly, they fall asleep.

I recall one red-bodied dragonfly that had fastened itself for the night at the end of a low twig on an apple tree. Grasping the twig a foot or so from the sleeping insect, I swung it up and down, from side to side, in circles. The dragonfly slumbered on. I shook the twig with increasing violence. The insect neither lost its hold nor aroused from its deep slumber. It was used to such gyrations during windy hours.

Close-up of a grasshopper resting on a grass-stem.

Many insects cling to the underside of leaves or hang upsidedown, like miniature sloths, from twigs during their period of slumber. I once found several hundred bumblebees sleeping in the bark-crevices of an oak tree. Another time, I came upon a banded fly stabled within a blue morning glory, and, on the slope above the grassclump, the primrose moth often spends its sleeping time tipped up like a plane that has nosed over in landing. Its head is usually hidden from sight. Similarly, at my grassclump, I discovered a slender, green grasshopper sound asleep at nine o'clock on a September morning. It was standing on its head at the exact juncture of stem and slender leaf on one of the stalks. The head of the insect was thrust down into the space between the two, and its tapering green wings, almost exactly the color of the grass, had the appearance of a sprout growing from the plant. I had been examining the clump for more than a minute before I became aware of the insect's presence.

This same grasshopper, one of the shrill night-singers, will sometimes sleep standing on its head, even when it is on bare ground. In such a position, its slender, green body attracts less attention from above, where birds are passing, and on the ground it has a striking resemblance to a blade of grass growing from the soil.

A few years ago, early in October, an exceptionally large migration of Monarch butterflies passed down the Atlantic coast. About a mile from my Insect Garden, a small oak grove was festooned with the sleeping insects when dusk arrived. They hung so thick upon the leaves and twigs and branches that in the space of a single foot I counted 100 of them. Where several hundred clung to one branch fifteen feet from the ground, giving it the appearance of being clad in brown, late-autumn foliage, I tried an experiment. I shouted; I clapped my hands; I jumped up and down below the limb. The insects showed no sign of being awakened by my performance. But, the instant I tapped the tree-trunk with a stick, the butterflies exploded into the air in a swirling cloud. They were sensitive to vibrations; the stroke of the stick had awakened them at once.

During the last days of this migration, I witnessed a spectacular example of how these frail-appearing creatures are able to find secure sleeping quarters during nights of violent weather. Only a hundred or so of the butterflies were in the oak grove one evening when hurricane warnings were posted along the coast. That night the great wind struck the south shore of Long Island, reaching a velocity of more than eighty miles an hour and blowing down two of the oak trees that were more than a foot in diameter. Yet, the next morning, when I visited the grove, more than a dozen monarchs, uninjured and unscathed, were sailing about over the wind-trampled wildflowers in search of nectar. Probably they had found sanctuary on the lee-side of the larger tree-trunks, close to the ground.

After dark, I sometimes run the beam of my flashlight through the grassclump, sending the stem-shadows racing back and forth in the interior until the whole tussock seems strangely alive. In this beam,

I often see the immobile forms of day-insects sleeping there during the hours of darkness. Both by day and by night, the insects of my hillside find protection in the grassclump for their period of slumber. I have seen a striped tan-and-black grasshopper asleep on one stem and a damselfly clinging asleep to the seed-head of another stem while, only a few inches away, a green meadow grasshopper—a night-singer—shrilled its penetrating buzz-saw song without disturbing the rest of fellow residents of the clump.

When the concentrated beam of my flashlight shines in the eyes of some insects, they awaken at once. Others begin to stir sluggishly. Still others slumber on. Tests made by a European scientist have shown that, in the case of the bee, the simple eyes, which are located between the main compound eyes on the insect's head, have much to do with the speed with which the creature awakens in the morning. If these ocelli are covered up, the bee awakens slowly. If, on the other hand, they are uncovered and functioning normally, the insect is aroused quickly by the presence of light.

From mid-September until the night of the first frost, whenever I swing the flashlight's beam downward into the maze of slender stems, I see the bottom of the tussock seething with crickets. September is the month of the Orthoptera; it is Cricket Time, Grasshopper Time. Everywhere in the grassclumps, then, the omnivorous black field crickets are hunting for food. According to the U. S. Department of Agriculture, cattle in a lush pasture require a week or more to consume their own weight in food. In contrast to this, the ravenous field cricket will devour its own weight in food in eighteen hours. It dines, with equal relish, on meat or vegetables.

This fact was responsible, a few years ago, for a surprising specimen brought by a neighbor-boy to Chris Olsen, of the American Museum of Natural History. It was a black field cricket with a brilliant green grasshopper head. The boy had found it in his garden. Inside its glass jar, it crawled and hopped and seemed in perfect health. The explanation for its hybrid appearance was simple. The cricket had been dining on meat, eating a dead meadow grasshopper. It had chewed its way into the head from the rear and then, like the cat with its head caught in a salmon can, found it could not back out again. By morning, however, the cricket had a cricket head. But it was still wearing a bright green collar. It had eaten all of the grasshopper head that its jaws could reach.

Some years ago, Charles G. D. Roberts wrote a poem that contained the lines: "And its Oh, to be a cricket in the warm thistle thicket where the sun-winds pass. . . ." During the latter weeks of summer, in daytime as well as at night, my grassclump is the playground and the home of these dark and active insects. Even under a blazing noonday sun, I watch them leaping, clinging, producing their cheery insect music, as the summer draws to its close.

All along the edge of my swamp, during the month of August, the feathery tops of the grassclumps break out into a foam of rust-red pollen. As I push among them, on hot, dry days, the pollen sometimes flies into the air like a cloud of rising gnats. My bare arms become speckled with the little flakes of rust, the masses of pollen pendant from the grass-tips. Occasionally, I have seen a resting dragonfly splotched with spots of pollen and once a small, yellowish spider, which had drawn silken threads downward from the arc of one of the grass leaves, clung in place with a flake of the rusty-red dust adhering to its back.

Because of this dust, long, slender seeds dangle from the feathery top of the grassclump during the days of autumn. By then, the rising stems are losing the rich green of the midsummer weeks. They are paling, turning yellow-green, hardening, becoming dryer. By late October, the green island of the grassclump is no longer green; it is now a toasted golden yellow. The voice of the breeze among the stems has lost the sibilant softness of summer days. It is shriller, harsher—presaging a harsher season. You can close your eyes on a windy day and tell the time of year. Gusts, progressing down the edge of the swamp, smite a series of dry grassclumps and each in turn gives forth a long hiss and sound like the dry rustle of locust wing.

And then, on some day of late-fall sunshine, when chunks of cattail fluff are flying before the wind like pale-tan moths, I see a November fly clinging crosswise to the dry leaf of one of the grass-stems. It is the last visitor. After that, the island in the air is deserted. But, below it—in crannies at the base of the stems and among the tangled roots of the tussock—minute hibernating insects still find a sanctuary.

Kinship with an Underwing Moth

By ELSIE HOPE DEVOL

The Underwing, in sober drab,
  You do not see, as you pass by;
But in her singing heart she knows,
  "I may wear colors when I fly."

The prison of the commonplace,
  Men, as moths, must wear, it seems;
Yet, deep within, God grants to both
  The singing heart, the rainbow dreams.

So moths and men have common hope:
  The dull and drab every-day
May change to garments glistening fair,
  If to the heights we find the way.

This message read, of moths, to men:
  When shadows gather into night,
'Tis but the harbinger of joy,
  Of wings unfolding, visions bright.

Rock Spring

By RUTH M. RASEY

Illustrated by Garnet Jex

". . . when sons grew big enough to help with the chore, they used a wooden yoke, made to set upon their shoulders."

ROCK Spring has never failed. Its cold clear water gushes the year around from its rocky cavern high on our Vermont hillside.

Giant sugar maples, pungent spruces and wild apple trees drop leaf and cone and fruit upon its brink. Nearby the hermit thrushes and chewinks spill their melodies through the summer days and early evenings. And when the cold drives them away, other songsters, the chickadees and buntings, join their voices with the singing of the water. Mountain pink and briar rose, hawthorn bush and lady's-slipper, purple violet and clematis, each in its season sheds its fragrant petals on the mossy green cliff above it. And where the silvery overflow gurgles down over the black earth, clumps of peppermint and cowslip drink deep and spread their luxuriant leaves.

Great-Grandfather found the spring in 1803. Having selected a good spot to build his cabin, he set out that September morning to look for water. And the wild wood inhabitants helped him. Not ten feet from the chosen homesite, Great-Grandfather spied a narrow trail of animal tracks leading up the hill. Following it, he came upon a velvet-eyed doe and her fawn, drinking from the sun-flecked pool. Startled by this strange creature, they raised their furry white flags and were gone. But they had led Great-Grandfather to the richest treasure of the hills.

With his hand-forged spade and hoe, he dug down and cleaned out the fallen leaves and twigs, making a three-foot basin with a spillway at one side of the top.

How many thousands of years the fox and hare and deer have drunk there, or the black-faced raccoons have washed their food there, no one can tell. But, for nearly a hundred and fifty years now, the spring at the foot of the rocks has unfailingly and unstintingly given its priceless gift to man.

When Great-Grandfather first brought his bride to their new home, they carried the water down the trail in wooden buckets dipped into the spring. Then, when sons grew big enough to help with the chore, they used a wooden yoke, made to set upon their shoulders. From each end of this yoke hung a hand-forged iron hook, from which a bucket was suspended, and thus the work of water-carrying was lightened.

When Grandfather grew up and settled on the gradually improved home place, he established a better water-system. Enlarging the spring, he walled it up inside with small cobbleheads picked from his neighboring meadow, and laid a cover of poles over it. Then, with back-breaking toil, he dug a ditch a foot deep, connecting the spring with his dooryard fifty rods away. All that winter he chopped down spruce trees four or five inches in diameter and

". . . Great-Grandfather spied a narrow trail of animal tracks leading up the hill. Following it, he came upon a velvet-eyed doe and her fawn, drinking from the sun-flecked pool."

trimmed away their branches. When he had a few more than enough of these small, four-foot logs to reach, when laid end to end, the length of his ditch, he set to work with a special augur. After boring in two feet from one end of each log, he repeated the process from the other end. When each of what must have seemed an endless pile of these had been bored with an inch, or somewhat larger, channel down its center, the ends were shaped to fit together with socket joints.

When warm weather came, these pump logs, as they were called, were carefully fitted together and laid, section by section, in the ditch, which was then refilled with dirt. Only once, the winter when a long spell of twenty-and-thirty-below-zero cold caused the frost line to burrow deep, did the water in the pump logs from the hill spring ever freeze.

What a thrill the whole family must have felt when they first saw the clear water gush from the end of the pump log into the great, hollowed-out tree trunk right at their door. And how Grandmother must have delighted in having all the water she wanted to wash her homespun blankets in, without anyone's tedious trips up the path to the spring.

How the sheep and cattle and horses and oxen must have reveled, too, in burying their noses, eye-deep, in the fresh, clean water in the new trough.

". . . horses and oxen must have reveled, too, in burying their noses, eye-deep, in the fresh, clean water in the new trough."

More than Grandfather's animals watered their thirsty throats in that and successor-troughs. Tired teams, hauling their heavy loads over the hill road, stopped there to drink and rest. Herds of cattle and flocks of sheep, on their way to and from the county fair, or in the fall drives, halted there to drink their fill or to nibble the lush grass that grew at its overflow.

Most of the year the overflow spilled down freely over the home meadow, enriching its heavy growth of clover and timothy and wild strawberries; or of potatoes and corn and oats the years that the plow turned the fertile sod into rolling black furrows.

But for a few days each May for many years, the overflow was held back at the sheep dam below the barn. There in a sizable pool the sheep were washed for the shearing. And there a few days later the water would be steeped into a strong tobacco solution. Into this Grandfather, and later his sons, with the hired men, would dip the lambs and shorn sheep, to rid them of ticks before turning them out to summer pasture.

Soon after water came to her door, Grandmother persuaded Grandfather to dig a branch ditch and tap the main pump log line to carry a stream of the clear, cold water back of the house. There, in the thick shade of Early Harvest and Spice Apple trees, the boys set another hollowed hickory trunk and built a rough shelter over it. Here, in the summer, Grandmother set her buckets of milk to cool before pouring it into pans for the cream to rise. Here she set her dash-churn, and here she "rensed" and worked her great wooden bowlfuls of firm yellow butter. Here, too, she kept her crocks of cream and finished butter, and here she scrubbed her dairy utensils. Only the clean, fresh spring water kept her churns and pans and buckets and crocks sweet and spotless.

Here also in later years the ten-gallon cans of milk for cheese factory or creamery were cooled each morning and evening in a big water-box, which succeeded the earlier log trough.

Pump logs, replaced in 1867 by lead pipe, carried Rock Spring water to the nearby sugar bush, as well as to house and barn. In earlier days more than one big brass kettleful of boiling syrup had been rescued from scorching by water from the wooden bucket and gourd standing close by. And more than once in later years, when the blazing logs in the great stone arch outstripped the boiler's watch, the sap-panful of precious sweet was saved by the fast dipping of water from the bubbling tubful at the door of the shanty.

Even now, when up-to-date equipment fills the sap-house, the tankful of spring water is the first to be readied, when tapping season opens. Spiles have changed from poker-bored sumach to galvanized steel, small wooden tubs to covered metal buckets, brass kettles to shining evaporators, and gathering-tubs on ox-drawn sleds to pulsing pipelines. But Rock Spring water has washed and readied them all for a hundred and thirty-seven sugar seasons.

Five generations of planters, haymakers, and har-

vesters, too, have quenched their thirst at the spring. In the days of scythe and cradle, the jug of gin or rum to replenish the small bottles that the mowers swung on their snaths was suspended in the spring. Later the buckets of root beer and switchel (a composition of ginger, vinegar, sugar, and water) that replaced the stronger drink hung in the spring's cooling depths, between the rounds of the mowers. And countless pailfuls of that cold clear water itself have my brothers and sister and I lugged to the farthest corners of our hill acres, to refresh the sweating men.

However, Rock Spring has filled more than the physical needs of man and beast and vegetation. When grief over the death of his hunting dog, who had been his constant companion since its puppyhood, came to my young brother, he climbed the path to the spring. There, at the edge of the woods, where he and his Bowser had picked up so many game-trails at the spring's outlet, Joe shed his tears, where no one could see. And there, beneath the autumn stars, and beside the soothing murmur of the water, he came to know that some part of his dog would be with him as endlessly as the water would be with the earth.

When the pattern of my life demanded that I go away from the old homestead, I, too, climbed to my childhood sanctuary at the rock above the spring. As memories of my beloved hill surged through my mind, the thought of leaving it seemed almost unendurable. So much, that I treasured most, had come to an end. Then the song of the spillway came to my ears, and peace came to my being. Nothing loved would ever be lost. Memory would keep it always, pouring it out like water from the rock.

Today that mountain spring feeds a concrete-lined reservoir for modern farm buildings. A tight wooden cover houses it from star and leaf and deer. But its liquid silver notes still join the vespers of thrush and chickadee. As long as the hills remain, Rock Spring will never fail.

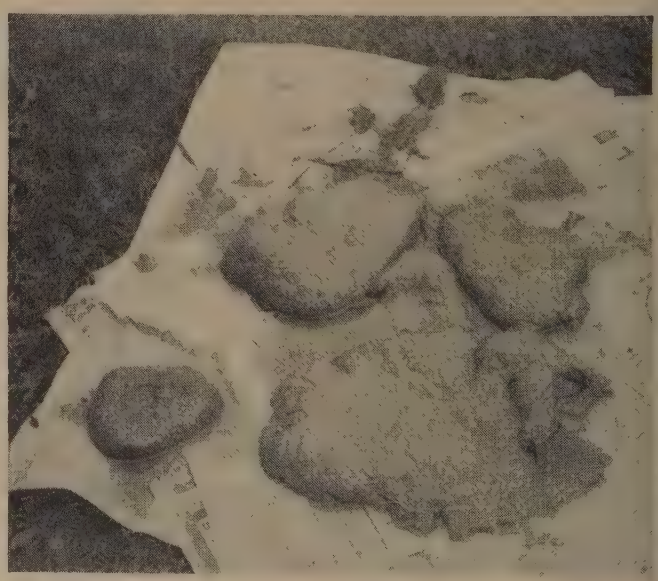
Don't Spare This One

I think that I shall someday seize
A parodist of Kilmer's "Trees"
And squeeze his neck with mighty grip
Until the sap begins to drip;
But since you, too, may view it thusly
Prefer to write anonymously.

Fresh-water Sponge

By RICHARD STUART PHILLIPS

THERE are many strange things in the world, and this gelatinous-looking mass, which resembles nothing quite so much as it does a platter of tired jello, is one of them. This is an animal—a fresh-water sponge that goes by the name of *Pectinatella magnifica.* Last summer, while on a fishing trip, my attention was drawn to a large, spherical object that was being borne along by the wind and current. I fished it out and discovered that it was a fresh-water sponge, its gelatin-like bulk fitting nicely into a three gallon scrub-bucket.



These sponges appear from August until October in lakes and reservoirs in the northeastern part of the United States. Usually they are about the size of a grapefruit, but occasionally one of them grows to truly enormous proportions. One of these floating balls will contain several thousand individual sponge animals. During late summer and early fall the sponge colony produces countless small structures, called statoblasts, that serve as an asexual means of reproduction. Each statoblast is equipped with an encircling band of air pockets that buoys it up, and a series of hooks that enables it to cling to any object with which it comes into contact. Wading birds sometimes carry these structures on their legs for several miles. The statoblasts enable the sponge family to pass successfully through the winter. They are resistant to drought and freezing, and once spring arrives each statoblast will give rise to a new sponge colony. All of the fresh-water sponges are related to those forms that are found in the sea. They have very slowly migrated up the brooks and the creeks that empty into the sea until now they are found thousands of miles inland, and they have undergone such changes that if placed in salt water they are unable to survive.

Although the golden-mantled marmots of Jenny Lake, Wyoming, were called "Rockchucks" by the natives, they lived under a pile of logs that had been cut for telephone poles. In this group were some of normal gray pelage with yellow cheeks, as well as some melanistic ones. One of the normal marmots sniffs at a proffered bit of bread, which it finally avidly devoured.

Golden-Mantled Marmot, Western Woodchuck

By GAYLE PICKWELL

Photographs by the Author

ALTHOUGH the lady at the nearby curio shop called them "Rockchucks," the golden-mantled marmots of Jenny Lake, Wyoming, might well have been woodchucks to her, for they lived beneath a pile of telephone poles that had been cut from the nearby lodgepole pine forest. These marmots are, indeed, the woodchucks of the West, close cousins of the eastern woodchuck. And, if, in the West, they usually live in the great rock piles of the mountains, they will also accept as homesites a pile of logs, as did the chucks of Jenny Lake, or as do their cousins of the woodlots of the East.

On Turkey Hill, east of Ithaca, New York, I knew the real woodchuck, for there I saw it scurry to its great burrows. On the elevations of the southern Sierra Nevada of California I knew the southern Sierra marmot, and on Mount Rainier the police-sharp-and-loud whistle of the Cascade hoary marmot was heard on several occasions as I rounded a projecting rocky crag.

All of these marmots, woodchuck cousins, are in the genus *Marmota*, although there are only three species of marmots in North America. Of all these three there are several subspecies or varieties. The hoary marmots, *Marmota caligata*, and relatives are by far the largest of the three, and the one that permits the marmot group to share with the porcupine and the beaver the distinction of being the largest of North American rodents.

In the Sierra Nevada I have watched the southern Sierra marmot, *Marmota flaviventris sierrae*, slip away from its sunny position on a boulder and slide into a rock crevice. The hoary marmots of Mount Rainier were out and whistling before the last of the snow had gone, and, as they ran from one burrow on an island protruding from a sea of snow to another island, they left their tracks in the still deep snow.

It was late July when the golden-mantled marmots of the Jenny Lake region in western Wyoming were photographed, and this 6000-foot-high Jackson Hole country had long before lost its snow. At Jenny Lake, with its jack-of-all-trades store and post office, there

The golden cheeks and shoulders of these marmots suggest the name of golden-mantled. They are really western woodchucks, the largest of which share with the porcupine and the beaver the distinction of being the largest rodents in the United States. Here a normally colored marmot stands erect as food is held above its head.

Blackie, a very black individual, was a special pet and the friendliest and most imploring of the Jenny Lake group. He also seemed to be the hungriest. Behind Blackie's whiskers a black band ran across his snout, and his cheeks were grizzled with white instead of being golden-mantled. He was always ready to come for food at a whistle or call.

were several cabins. Between these cabins was the great pile of logs and, beneath the pile, the golden-mantled marmots. These marmots were not in the protection of a national park, but the children of the neighboring cabin claimed them as their pets, fed them pieces of bread daily, and called them by individual names. These marmots were not only golden-mantled, but among the group were certain very dark, grizzled individuals that presented a melanistic phase of coloration. One of the dark ones was appropriately called "Blackie," and Blackie would respond most readily at the sound of one's voice. In fact Blackie was so persistent that it was hard to get pictures of any other marmot. Furthermore, it was the friendliest and, withal, the greediest. When I check over my negatives, I find I have five times as many of Blackie as of the normal-pelaged ones.

In normal pelage, the golden-mantled marmot, as its name implies, is suffused with a golden coloration over the sides of its cheek and shoulders. The remainder of the body is very gray, with the tail a darker gray. A black patch surmounts the muzzle and the top of the head.

Blackie was drastically different in color. This marmot was indeed black, but gray hairs protruded over the general body pelage. A surprisingly white band encircled the muzzle, leaving a black snout, a black ring behind the white band and a white forehead. All told, this made an exceedingly striking and photogenic individual.

To obtain the pictures it was necessary merely to establish our camera in a likely location and call, or have the nearby children assist, since their voices were better known to the marmots than the voices of strangers. Soon the black muzzle with the white band of Blackie would appear from the runway beneath the logs. Following this, the question was not whether Blackie would allow himself to be photographed standing upright, reaching eagerly for the bread fragments, but whether there would be any opportunity whatsoever to get photographs of the more timid normal-pelaged ones. However, with some hours of work on two different occasions, pictures were secured of the color phases of all the marmots living beneath the pile of logs.

It was determined that about seven animals were present. Of these, five were of normal color and two were the dark form. All of those observed were so nearly the same size that they must have been of approximately the same age. At least there were no small marmots among them. And they made an interesting group, repaying human friendship in marmot ways.

Kenneth Disher found that many people who wanted to could not get personally to the Cleveland Museum of Natural History, so, by the use of ingenuity and persuasion, he put——

Nature on Wheels

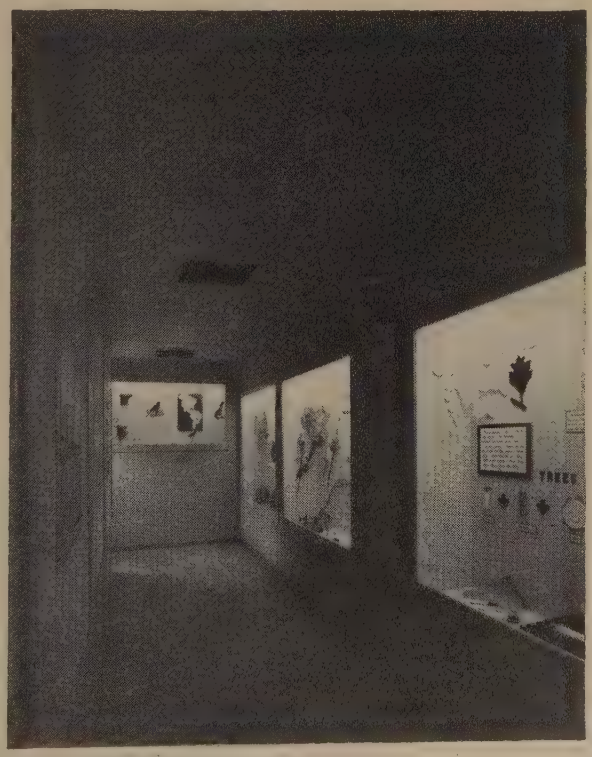
By RICHARD S. BLOCH

A trailer ingeniously made into a traveling museum to serve Cleveland citizens.

WHEN Kenneth Disher joined the Cleveland Museum of Natural History as its director he was dismayed because so many of the city's people were not able to get to the Museum to enjoy the exhibits. From his determination to do something about this situation came the world's first Traveling Trailside Museum.

In the first two months of its operation the Traveling Museum was host to 38,295 people. Among these were school children, aged folk, and hospital patients. The happiness caused by this project cannot be measured in statistics. It is measured by such things as the look of delighted anticipation in a child's eye, or by the smile on an old man's face as he finds new interests or recalls treasured memories.

In order to carry his philosophy into action, Disher seized upon every opportunity. An ordinary house trailer, which originally was to be used for a western expedition, sat idle behind the Museum. With help from an endowment fund and the *Cleveland Press*, Disher had this trailer completely remodeled into an attractive traveling museum, complete with panels and enclosed cases displaying mounted wildlife in natural surroundings.



Interior corridor and exhibits in the museum on wheels. Displays are changed with the season and field to be covered.

The removable displays are changed with the season. For instance, in the fall the theme might be "The Pageant of Autumn." One of the inside enclosed cases could contain samples of plants, showing the methods of natural seed dispersal. Another might display mounted birds, with descriptions of their migrating habits.

The exhibits in the enclosed cases on the right outer wall of the trailer add to and supplement the material on the inside. They also make it possible for a greater number of people to enjoy the project at one time. Special portable exhibits are taken into hospitals for the benefit of persons unable to leave their rooms.

Disher's inspiration and zeal for the Traveling Trailside Museum undoubtedly stems from his own rich experiences. When he was a young lad he toured the entire country with his family. His parents wanted to give him a real education in what constitutes our United States. He camped in the Sierra Nevada, explored Mammoth Cave, and followed trails of the Rockies and the Grand Canyon. In those days touring the country by automobile was rare. "It was no picnic," Disher recalled. "Why, it took us three months to get from Chicago to Los Angeles."

Disher's mother had grown

up as a girl in an Indian pueblo, her father being one of the first physicians assigned to the Pueblo Indians in Santa Fe. Young Kenneth visited this reservation many times, and became intensely interested in Indian culture. Later in life he managed the Indian exhibit at the San Francisco Exposition of 1939. It was the largest Indian exhibit ever held in the United States.

After leaving his Alma Mater, Pomona College, Disher taught foreign languages, geography, and American History, but he seized an opportunity to work in a museum at Flagstaff, Arizona, as an apprentice. While there he had a chance to study Anthropology, Archeology, Museum Methods and related subjects. Disher's wide knowledge has accounted for the scores of positions—too numerous to mention them all—that he has held, but one that stands out vividly in his mind is his job as Ranger Naturalist at the Grand Canyon. "It was a treat to go back in this capacity," he will tell you, "so many years after I had been through there as a boy."

Disher really came into his own when he took over the directorship of the Cleveland Museum of Natural History. Here, he believes, he can project his own ideas easily into action, devoting his time to scientific research and delving into his favorite notion of popular interpretation. He feels that the people should be brought closer to a real appreciation of the resources of this country, and should be taught good conservation practices.

The Traveling Trailside Museum is just a start, so far as Disher is concerned. In the back of his mind he has plans for broadening the scope of this project, and for the creation of other projects that will help bring the knowledge and resources of the Cleveland Museum of Natural History closer to all of the people, which, after all, is a museum's object.

Milky Way

By DANIEL SMYTHE

In emptiness beyond all bars,
The universe's oceans churn:
On their great walls the guided stars
In untouched splendor reel and burn.

Here on our mote, the speck of earth,
Belted by shifting lands and seas,
We look out to a broader girth—
The continent of galaxies.

A star-fire dots the flanks of night,
Hung on the vast, unmeasured wall.
Here is a tiny mind with sight
And thought that may contain it all!

Felted Footballs

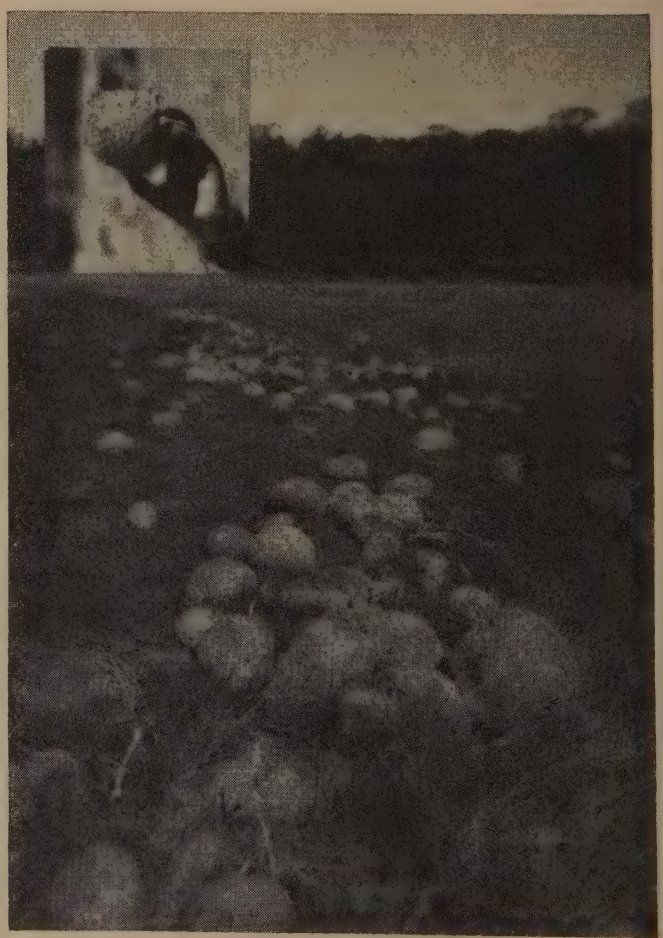
By ROBERT A. NIXON

ON THE northeast corner of Mt. Konocti, and within one-half mile of Clear Lake, California, lies a small alkali pond, locally known as Borax Lake. It is entirely dry for a great share of the year. There is a rather heavy growth of Bermuda grass at what appears to be the high-water line. Along the edge of this grass, toward the lake, are thousands of small, felted, football-like objects. They form a long line around the lake edge, with a few of them scattered in clumps back in the grass.

These little felted balls are about three and one-half to five inches long and about three-fourths as thick. They have the appearance of very coarse felt, gray-tan in color. The ball appears to be felted from a plant fiber.

The lake, during high water, is only a little more than a foot deep, hence the slope of the lake bed is slight. Probably the plant tissue is rotted away from the fiber by the alkali water, as in the treating of flax. Then, when the lake is full, the back and forth motion of the waves causes the fibers to be felted into balls.

These useless oddities of Nature, so far as can be ascertained, are neither named nor accounted for.



Beetles

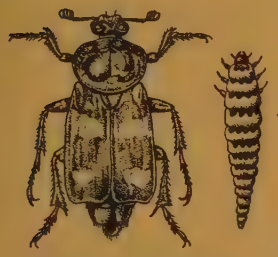
By E. LAURENCE PALMER

Illustrated by E. M. Reilly, Jr.

This is the fiftieth in NATURE MAGAZINE'S *series of educational inserts*

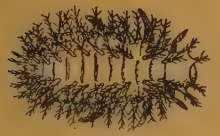
TIGER BEETLE

GROUND BEETLE



CARRION BEETLE

CONVERGENT LADYBIRD BEETLE



MEXICAN BEAN BEETLE

ASPARAGUS BEETLE

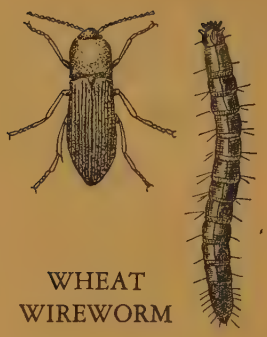
With this unit, we complete a half-hundred of these surveys of special features of Nature that seem to have special appeal. We have had to guess what your interests may be, and have tried to help those whose hobbies lie in studying stars, rocks, tracks, birds, insects, fishes, herbs, trees, reptiles, mammals and many other groups. We have gone to the sea, to marshes, to deserts and to weed patches for inspiration. We have appealed to those with academic interests and to those whose feelings are of a more home-loving type. It has been fun, and we only hope that the next half-hundred inserts may bring as much approval—and criticism—as we have had from the first fifty. We plan to spice the series in the future, as we have in the past, with numbers of a general nature. The inserts on sound, on age, on tracks, and on living out induced responses equal to those devoted to a consideration of more orthodox systematic divisions, and we feel such material should be represented by similar units in the future.

We welcome any suggestions from those of you who have stuck by this series through the years, and from those who are newcomers, as well. To help the old-timers whose series are complete, and to show the newer arrivals the scope of the series in the past, we are devoting the School Page in this number of NATURE MAGAZINE to an index to the subjects covered in these inserts. We hope that this will find sufficient use to warrant the effort put on its preparation.

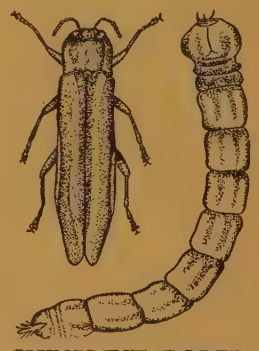
In part to get material for the new units in this series, we are starting on a trip that will take us from the Atlantic to the Gulf Coast, and on west to the Pacific, from Mexico to Canada and back through the northern United States and southern Canada. We have fifty pages in a notebook of a looseleaf type on which we hope to jot notes that will bring these new units of the series down to earth. We will talk matters over with you who are teaching, and with you who are not, and will try to act as a sort of Nature reporter. We like to think that this procedure will provide many new and stimulating contacts of a sort that will improve the usefulness of this feature of NATURE MAGAZINE.

And now it behooves us to get around to the subject of this particular insert. I chose beetles deliberately for this special insert because they have always had a particular appeal to me. Ever since I began collecting insects as a youngster I have favored beetles, for some reason or other. As a graduate student I developed a particular interest in whirligig beetles, and I am reserving a special place for these insects in the plans I am making for my old age. I never shall be an authority on the coleoptera or on any small section of that enormous group, but I am confident I shall never be bored if I keep trying to add to what I know of them.

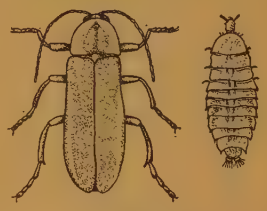
If any of you start studying these insects, you will certainly continue to be interested in them. I still remember the thrill I got when watching some whirligig beetle eggs hatch under a microscope thirty years ago this spring. And if none of you have ever watched the larva of a water scavenger beetle stalk its prey and overcome it when it has been captured, I am sure that if you can witness the event through a microscope, as I did, you will remember it longer than you will the most



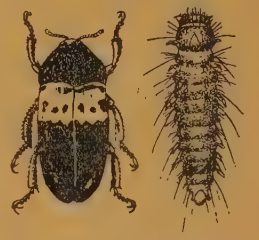
WHEAT WIREWORM



CHESTNUT BORER



FIREFLY



LARDER BEETLE

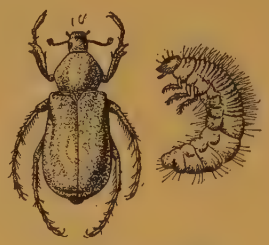
CHESTNUT WEEVIL

SCARAB

thrilling movie that comes to your town in this next month. Better than that, the beetle drama will cost you nothing, other than a little patience.

We gave you illustrations and life history material of the commoner aquatic beetles in the first unit of this series, and see no reason why we should repeat this material here. I merely want here to suggest one little inquiry about aquatic beetles that you may wish to investigate on your own.

You all know the little whirligig beetles that run around in dizzy circles on the surface of streams and pools in summer. These whirligig beetles have four eyes. Two of them are directed downward and two upward, with a definite border between them at the water line. A world-famous entomologist friend of mine is perfectly sure that the lower eyes are used to observe possible food or enemies that are under water, and the other pair are used to see what goes on above water. To him, it is obvious that the structure implies an appropriate use. However, I happen to know a psychologist whose ability I respect, and who feels that the lower eyes do not function as they should. He has fooled with the living insects over a long period of time, using common-sense procedures to test what might seem to be the natural use to which these eyes would be put. He feels that they do not function. Possibly, you may wish to join in the study. A few beetles in an aquarium, with some device to test the ability of the insects to respond to a controlled stimulus, will give you some interesting experiences.



ROSE CHAFER

CARPET BEETLE

POTATO BEETLE

But what are beetles, anyway? We find members of the group to which they belong spoken of as bugs, as flies, as worms, as weevils, as grubs, and as many other things. In spite of this, the different animals have something in common. For one thing, most of them are well supplied with relatively hard forewings that cover the middle or back part of the body more or less effectively. Under a hand lens, these wing covers ordinarily look as though they were well supplied with rivet holes. They look as though they were well-constructed shields. These shield wings, of course, are the features that give the group its name Coleoptera, which means shield wings.

The beetles have biting mouth parts, a pupal stage in their life history, and a number of other characters that combine to give the group some semblance of unity. They eat almost any kind of organic material, so they have no unity in that direction. They may eat plants, animals, waste, manure, or other insects, and because of this variety we can neither praise nor condemn the group as being friends or foes. They live where it is hot, and where it is cold, where it is wet, and where it is dry. They are active in brightest sunlight, and in darkest midnight, high in the mountains or deep in the soil or water, so they have no common character with respect to time, place or temperature that can be considered as definitive. They have modified the prosperity of man favorably and unfavorably, have appealed to his most competitive instincts and to his laziest traditions. They have and will make and break communities economically, and they will not stay put. They have weaknesses that we have discovered which make our mastery of them partial at least, but they have other weaknesses that we know must exist, but which we have not as yet discovered. They can produce cold light, which we do not know how to duplicate. They are no doubt sensitive to sounds, odors and other disturbances that are meaningless to us. They can help physicians and can cause disease. They are beautiful and disgusting, active and sluggish, large and small. There are at least 250,000 known species, and they have lived on the earth, in one form or another, continuously from late Permian times to the Recent. They may complete their life cycle in a few weeks or may spend a number of years in the process. They can fly through the thinnest air, or make their way through metal, seasoned wood or firmly packed earth. They can swim and dive, burrow and climb. They have marital relationships as varied as those of all the races of human beings combined. They are sensitive to the slightest change, or able to withstand remarkable extremes. They have been pictured generically as villains and as saviors, and one or another of the beetles measures up to all of the extremes so far suggested or implied. In short, they are well worth knowing unless you are intellectually inert to challenging situations.

Beetles have appeared in ancient and in modern art, in the drama, in prose and in poetry. Their sounds have been imitated by musicians. Their names are written in history on paper pulp, on papyrus and on stone. Their remains are found in fossil muds and sands. In psychology, physics and chemistry, they have, we believe without intelligence, been able to match or exceed some of the undertakings we have been able to do with intelligence. They have been misunderstood as often as they have been understood, under-evaluated and over-evaluated, admired and despised, courted and avoided, welcomed and feared. Obviously, we cannot adequately present in eight pages a comprehensive story of this group of animals.

Texts galore have been written on animals in which the beetles are given just representation. Some have dealt primarily with the classification of the animals. Others, like those of Fabre, have presented their interpretation of beetle behavior. A. A. Milne gave us a juvenile's appreciation of a pet beetle in his "Alexander Beetle", a bit of verse that everyone should read at some time. Egyptian art makes much of the scarab beetle, to which much unwarranted significance was attached. The play "The World in Which We Live", which had a long run in New York a few years ago, drew delightful but probably unwarranted comparisons between the concern of a dung beetle for its little hoard and man's concern for whatever material wealth he can accumulate. Poe gave us "The Gold Bug", which was

really about a beetle, but he tied it beautifully into the treasure hunt idea we so frequently associate with Captain Kidd.

The poets vary in their mastery of the lore of the beetle. Some apparently know what they are talking about, while others obviously do not. Let me give you examples from Coleridge, Longfellow, Lowell, James Whitcomb Riley, Tennyson and Shakespeare to see if you can properly associate the poets' style with references they make to beetles of one sort or another. At the end of this article, you will find a key to the authorship of the verses quoted.

One of our poets writes: "The beetle booms adown the glooms and bumps along the dust". Another speaks of "crushing the beetle in his coat of mail". Few should fail to identify the authorship of this one: "The glow-worm shows the matin to be near". Still another, writing of midnight, uses the firefly as follows:

"The fireflies o'er the meadow
In pulses come and go."

This simple picture of firefly behavior is a bit more involved when we read from another poet:

"Many a night I saw the Pleiads
Rising through the mellow shade
Glitter like a swarm of fireflies
Tangled in a silver braid."

One of the poets mentioned has a more discerning understanding of firefly behavior than does a lesser light writing on the same subject. One of the poets quoted says:

"While many a glow-worm in the shade
Lights up her love torch."

The lesser poet, writing on the same subject, says:
"Among the crooked lanes on every hedge
A glow-worm lights *his* gem; and through the dark
A moving radiance trembles."

Another lesser poet, however, recognizes the female as a common source of light, in writing:

"When evening closes nature's eye,
The glow-worm lights *her* little spark
To captivate *her* favorite fly
And tempt the rover through the dark."

It is encouraging to find that the better-known the poet is, the more nearly correct may be his interpretation of our favorite subject. For the fun of it, we looked up what a beetle was in a well-known Bible concordance and found that it was listed as a sort of locust. I fear that we shall have to withhold comment on that one.

But now to more practical things about our beetles. Many of the details of the habits and control methods associated with the species here figured are given in the accompanying tables. These need not be repeated here. We could write of the invasions bettles have made into different parts of the country, and of the destruction they have caused when they have been freed from their natural enemies. We have the Japanese beetles as a recent and spectacular example of trouble that may be caused by some of the group. Here a species was moved suddenly a great distance. There are, however, slower migrations made by beetles that have been equally destructive. The Colorado potato beetle moved in from the west to the eastern potato field relatively recently. Still more recently, the Mexican bean beetle, a ladybird beetle, moved into territory where the school texts contended that ladybird beetles were useful destroyers of other insects. Some bean growers of whom I know in New York state have reservations regarding this popular generalization.

MAY BEETLE

JAPANESE BEETLE

STAG BEETLE

One of the more interesting uses to which man has put beetles, aside from using them to fight their own group, is that employed with some of the dermestid beetles. These beetles, in the larval stage, feed on meat—preferably meat that is somewhat spoiled. What is more natural, then, that where one wishes to remove meaty tissue the grubs of these beetles might prove useful. Zoologists charged with the task of cleaning skeletons for demonstration purposes found it much simpler to let the beetle larvae do their work for them than to wield their own scalpels. Besides, the beetles could be so controlled that just the proper amount of cartilage could be left to hold certain bones in position. It was only natural that if beetle larvae could be used to remove flesh that was dead, while they avoided living tissue, that this property might be used in cleaning away dead tissue on living animals. The animals have had a limited use in this direction.

A European blister beetle, *Lytta vesicatoria,* is commonly known as Spanish fly. This beetle is ground up into a powder which, when applied to the skin, may cause serious blisters. In a restricted form, it has sometimes been used as a medicine. Of course, the fireflies also are beetles, whose common name carries the term "fly."

The term "bug" is also applied to a number of common beetles. For example, we have ladybugs that are beetles; Junebugs that are beetles; tumblebugs that are beetles. Unlike the true bugs, these beetles, of course, have chewing mouthparts rather than sucking mouthparts.

While flies and bugs are words used rather promiscuously to refer to insects in many orders, it is not common to find such terms as weevils and chafers and the like applied to anything but the coleopterous insects.

Social life, as we find it represented in some other orders, is not common among beetles. We have tent caterpillars building community homes, among the lepidoptera, and, of course, the wasps, hornets, bees and ants living in complex social groups. But in the beetles there is little of this. True, many beetles may be crowded together at a given point at times, but this is merely because suitable food is there, and the population has not been depleted by enemies. Possibly one might recognize some community spirit in what happens with the engraver beetles, but this is not in keeping with our ideals at all times, and it may be merely a matter of convenience rather than any social scheme.

(Continued on Page 312)

COMMON NAME SCIENTIFIC NAME	TIGER BEETLE *Cicindela sexguttata*	GROUND BEETLE SEARCHER *Calosoma frigidum*	CARRION BEETLE *Necrophorus marginatus*	CONVERGENT LADYBIRD *Hippodamia convergens*
DESCRIPTION	Length: 7/16- to ½-inch. Usually, a brilliant metallic green or blue green with rather conspicuous but small, to 10, ivory markings around the margins of the wing covers. Legs: long and slender and capable of rapid movement. Antennae: relatively slender and about the length of the front legs.	Ground Beetles are usually black or dark colored. Some are bright colored, or with bright parts. They are up to one inch long and are active in the larval and adult stages.	This species is nearly an inch long, with a cylindrical body. It is dark with dull, red markings on the fore wings. These wings frequently do not reach the end of abdomen. Animal appears stout and rugged.	Length: about ¼-inch. With 2 white, converging dashes on back, in front of wings, and 13 black dots on the orange wing-covers, and a white border on the thorax. General appearance like a small "split pea." Some lady beetles are red, black or yellow spotted, and some entirely black. Larvae: active, usually dark-colored.
RELATIONSHIP AND GENERAL	Family Cicindelidae. The tiger beetles. More than a hundred species are known, in one form or another, over the United States. They are practically all beautiful, active species, useful rather than destructive, and interesting because of the habits of both the adults and the larvae.	Family Carabidae. Found usually on the ground, commonly under trash, where it may be moist. Some species climb trees but this is unusual. There are at least 1200 kinds of ground beetles in the United States.	Family Silphidae. Found usually on dead animal matter usually under cover. There are more than a hundred species of carrion beetles known in the United States, including *Silpha americana,* a common short, flat, round insect.	Family Coccinellidae. Adults common, and larvae very common on melon vines. Some adult beetles are found in houses on windows in spring and fall and some congregate in great numbers under trash on the ground. About 100 species of lady beetles in North America. Mostly useful, but some pests.
REPRODUCTION	Adults are usually active through the warmer months, most species in bright sun, but some at night. Males show 7 abdominal segments; females, 6. Larvae of tiger beetles usually live in vertical burrows in sand or hard earth with jaws ready at bottom of pit to grab insects that may fall into the pit.	Some ground beetles lay their eggs in mud cells on leaves. Larva can run around actively, and has strong jaws. In this species, it lies in wait in a burrow for its prey. Larva may molt twice in about 2 weeks, then turn into an inactive larva for another 2 weeks, then become a pupa for a week, before becoming adult.	A pair of *Necrophorus* finding a dead bird or piece of carrion will remove the earth from beneath and place it on top, eventually burying the flesh. On the buried flesh, the female lays her eggs, which hatch into larvae that feed on the flesh thus provided. The pupal stage is passed nearby.	Eggs laid in spring, on plants after adults have hibernated in great numbers, usually in highlands. The larvae begin eating small insects and insect eggs or even spiders, and grow rather rapidly. They finally transform into pupae that hang by the tail a few days before transforming to the adult stage.
FOOD AND BEHAVIOR	Behavior of adults in alighting on sidewalks to face you as you approach, of the larvae that will grab a blade of grass thrust into their burrows, makes these insects worthy of continued study by the average field naturalist, not only because of the vigor of their actions, but for other reasons.	Food of almost all ground beetle larvae and adults is other insects, particularly soft-bodied caterpillars, which are run down and eaten. They are most active at night. Adults may live nearly a year, wintering in that stage, with the egg-laying limited to early summer, in some species.	Food of larvae and adults, of course, is the carrion they find and bury. Some carrion beetles may attack and kill small animals like snails, and some live on decaying vegetable matter. Some of the larger insects may move an animal the size of a rat some distance to get it buried properly.	Food of this species, small animals only, including many kinds of plant lice, asparagus beetle eggs, eggs of Colorado potato beetle, grape-root worm, bean thrips, alfalfa weevil and chinch bug. The related Mexican bean beetle is a serious plant crop pest of the Southwest, and has spread to New England.
ECONOMIC IMPORTANCE	Probably more useful than harmful, since they are essentially destroyers of other insects. No doubt they do not discriminate between those that are useful to man and those that are not. Because of this it is not probable that any control measures may be necessary or desirable.	Ground beetles are useful throughout their lives, since they prey on other insects that are for the most part harmful to man's interests.	These insects serve primarily as scavengers, and, for the most part, may be considered as beneficial. Those species that are close relatives, such as *Silpha bituberosa,* which feed on vegetable crops, of course may be considered as pests. These are mostly western.	On Pacific Coast, convergent lady beetles were collected in great numbers and distributed in crop areas. 30,000 are considered adequate for protecting 10 acres of cantaloupes from scale insects. They were collected by the ton. Mexican bean beetle controlled by spray of 1 pound of magnesium arsenate to 50 gallons of water, or by dusting.

MEXICAN BEAN BEETLE *Epilachna varivestis*	WHEAT WIREWORM CLICK BEETLE *Agriotes mancus*	TWO-LINED CHESTNUT BORER *Agrilus bilineatus*	FIREFLY *Photuris pennsylvanicus*	LARDER BEETLE *Dermestes lardarius*
Length, about 1/3-inch. Width, about 1/5-inch. Light yellow to yellow brown with 8 conspicuous but small black spots on each wing cover, but with no black spots whatever before the wings. Legs, relatively long and slender. About equally rounded in front and rear. Head, inconspicuous.	Length, 1/3-inch. Dull, red-brown, darker in the forward parts. More or less uniform in diameter and bluntly pointed at each end. Apparently conspicuously jointed 1/3 distance from the front. Antennae, slender, divergent. Legs, about equal in length, relatively slender, and are folded when animal is disturbed.	Length, 3/8-inch. Slender, with relatively parallel sides and with body generally uniform in diameter in forward 4/5 of length. Antennae, short, backward curving. Eyes, to the front. Legs, about equal in length and but little modified. Black, with a slightly greenish tinge, somewhat sparingly clothed with a golden-yellow fuzz.	In *Photuris*, the head is not completely covered from above as is the case in the related *Photinus*. In *Pyractomena*, and in *Photinus*, eyes are large in males and light organs well developed in females. Legs, comparatively short. General shape, oblong and flattened. Antennae, rather long and nervous. Some species do not give off any light.	Length, 1/4- to 1/3-inch. Dark brown, with a pale yellow band across the forward half of the wing covers covering nearly 1/3 of the total length and bearing irregularly placed dark dots and narrow bands, but usually with 3 dots on either side of the central line. Antennae, short and relatively slender.
Family Coccinellidae. Related to the ladybird beetles most of which are useful. Range originally in the southwestern states of New Mexico, Arizona and Colorado, to which it had migrated from Mexico, is now extended to New England. A recent report from Kansas says it is not now known from that State.	Family Elateridae. Relatives include click beetles or wireworms, which are serious pests of corn, sugar beets, cotton and many other plants, including some woody plants. Some relatives prey on other insects, at least in the larval stages. Many of the larger ones are found most commonly under dead wood of fallen trees.	Family Buprestidae. Members commonly spoken of as "squareheads", but rather closely resembling the ordinary click beetles. Relatives attack apple, raspberry, blackberry, pine, maple, poplar, beech, birch, sumac, and dogwood and other woody plants, in which they bore as larvae. Some attack herbaceous plants, living as leaf miners.	Family Lampyridae. The fireflies. Best known as lightning bugs, and the larvae or wingless females as glow-worms. There are over 50 species of fireflies in the United States and many more to the south. Most of them are nocturnal but many common forms are to be seen by day feeding in fields and gardens.	Family Dermestidae. Relatives include the buffalo bug and a number of museum pests, as well as some species that are used in laboratories for cleaning skeletons, and to some extent in medicine. Rather widespread in homes where conditions are suitable, but do less well where rugs are movable or where materials are changed often.
Adults appear in spring at about time beans appear above the ground, lay eggs (yellow) under the leaves. In a few days, spiny grubs hatch and begin feeding on the leaves. When mature, the larvae pupate on the under side of a leaf, and from these pupae the adults emerge in a few days. Winter spent in adult stage. One annual brood.	After mating in April or May, female lays eggs under ground. Larvae become half grown by season's end and complete growth the second season. When mature, they enter an earthen cell and pupate during third season, emerging as adult about three years after egg stage.	Eggs, laid in spring on the proper host tree. Grubs enter growing tissues of the outer bark and on through inner bark to sapwood, forming flattened cross passages that may occur from top to bottom of the tree. Larval stage may last through to next spring, becoming pupae in bark or outer sapwood for about 2 weeks before emergence of the adult.	Sexes probably attracted by light emitted by female. Eggs of some species are luminous. Larvae of some species may glow in the soil, where they live, or under bark or plant trash, where they seek soft-bodied animals such as earthworms or snails, on which they feed. Pupal stage is usually passed under ground for about 10 days.	Adults enter houses in May. Lay eggs on food or in cracks and crevices in pantry or near meats, particularly those that have begun to spoil. Larvae develop rapidly and it is probable that a generation may be completed in from 45 to 50 days, permitting several generations to develop in a year. Adults may leave house or remain in it.
Mature and developing larvae do tremendous damage to leaves and fruits of beans. Larvae are about size of the adult, but are light yellow and covered with black-tipped, stout, branched spines when mature. Some control is effected by cleaning up old trash and plowing infected fields, or hand-picking may be worthwhile at times.	Most destructive stage is the larval period when the insects destroy many roots of important plants. Adults may be attracted to light and are identified by reddish color. Larvae have 2 dark spots at base of last body segments and may reach a length of at least 1 inch.	Adults have habit of sunning themselves on the host tree during May and June, when they are flying, mating, and laying eggs. At this time, they may be collected by holding a cloth beneath them and striking the tree violently. Grubs are 1/2-inch long, cream white with pair of brown forks at the rear. They do the damage.	Food of different species varies, from animals already suggested to plant material. Light is cold, produced in the abdomen, probably by oxidation of granules in outer layer, oxygen being supplied by tracheae under control of nervous system. Some species flash lights in unison. Light is usually yellow.	Cheese is most attractive to these beetles and may be used as bait to attract large numbers where they may be killed in quantity. Cheese ground with arsenic may be used as a poison bait, but it is of course dangerous to leave where it may by accident get into the food of pets. Infected parts of meats should be cut off and destroyed.
Normal control is by dusting plants with paris green diluted with 100 parts of air-slaked lime, often applied with Bordeaux mixture used for fungus control using 1 pound of paris green to 200 gallons of Bordeaux. This species makes fools of the science education testers who repeatedly contend that ladybird beetles are all useful.	This species is destructive of potatoes, corn, wheat, carrots, turnips, cucumbers, beans, as well as of pasture and lawn grasses. Control is by practicing short rotation of crops, which interferes with the essential 3-year life cycle. Larvae and adults may be attracted by baits of clover dipped in paris green.	When chestnut was abundant this insect was a serious pest and it is still dangerous in areas where the tree survives. Damage appears first when the tree begins to die from the top. In Europe, trees are killed to serve as traps that once infested may be destroyed entirely.	Of little economic importance except as suggested above, but of tremendous challenge to understand the production of a cold light. Of course, they have inspired poets and story tellers. A Jamaican marsh lighted at 10-second intervals by host of fireflies simultaneously is a sight not to be forgotten.	Larvae are easily recognized as hairy-bodied animals that cluster on infected areas. Where pest is abundant, it may pay to fumigate storeroom or pantry with carbon bisulphide or cracks may be sprayed with benzine under careful supervision to avoid fire. Infected meat not destroyed may be treated with dilute carbolic acid.

COMMON NAME SCIENTIFIC NAME	BUFFALO BUG *Anthrenus scrophulariae*	STAG BEETLE *Pseudoleucanus* sp.	SCARAB BEETLE TUMBLE BUG DUNG BEETLE *Scarabaeus* sp.	JUNE BUG MAY BEETLE *Phyllophaga* Spp.
DESCRIPTION	Length, about 1/7-inch. Attractive, black, white and red, with a black background, spotted and speckled with white, and a central red line down the back. Larvae, nearly ¼-inch long, clothed with long, brown hairs, those on the sides and under rear parts being the longest.	Stag beetles may measure about one inch in length. The males especially may be characterized by having large jaws. Color, usually black or red-brown, usually appearing smooth but really finely pitted. Head and eyes are usually prominent. Antennae, of 11 segments and elbowed, with 3 end segments grouped to form a club.	Illustrated is the sacred scarab, *Scarabaeus sacer*. When at rest, the legs may be folded tightly, and the conspicuous back and uniquely scalloped legs are black or nearly so. Beetles are relatively active and males and females resemble each other closely. Have long attracted the attention of people.	Length, to one inch, or as short as ½-inch. Stout, dark brown, and usually glossy above, with small heads, relatively slender legs, and a stupid behavior. Larvae, "white grubs", usually with rear bent forward beneath, dark heads, and short, stout legs forward.
RELATIONSHIP AND GENERAL	Family Dermestidae. Introduced into America about 1869, and many times since, it has become a serious pest. It is a native of the Old World, where it was worst in museums, but it is now established in America from coast to coast. Strange to say, it seems to be worse where established in America than in Europe.	Family Lucanidae. Relatively few species, including those that are commonly spoken of as "pinching bugs". Jaws of the males are frequently twice the size of those of the females. Some species have branched jaws that resemble antlers of a stag and give the group its name.	This species, *S. sacer*, is native of the Mediterranean countries and has been well known in Egypt for centuries. The family is Scarabaeidae with at least 20,000 species, among which are the well-known May-beetles. Most of the genus *Scarabaeus* are found closely associated with dung of cows or horses.	Family Scarabaeidae. Adults found in tree tops, or in houses where they are attracted by lights at night. During day, remain hidden. Larvae, underground. At least 100 species of the genus. In South, they are common in longleaf pine area. Less common on West Coast, but worst in Mississippi-Great Lakes region.
REPRODUCTION	Wrinkled, white eggs are laid on clothing, feathers, furs, silks, carpets. These hatch in 2 to 3 weeks into grubs that reach 1/5-inch, during which time the skin is shed 6 times and destruction takes place. Pupae are formed within the last larval case and are smaller than the larvae. Adults appear in fall and winter.	Adults commonly fly by night, producing a startling buzzing sound and may be frightening in habits. Larvae commonly are found in dead, decaying wood, particularly if it is damp, and develop from eggs that are commonly laid in bark crevices at the base of tree near where decay is taking place.	Adults make little balls of dung in which the egg is placed and which is rolled to a secluded spot and hidden. Usually, a single egg is laid in a dung ball and the resultant larva develops within the ball, feeding on it. Pupal stage is spent in the cavity in which the dung ball was hidden.	Eggs, 50 to 100, white, cylindical, laid in glued-earth cell underground, hatch in 10 days to few weeks, into white grubs, which do not mature until the 2nd or 3rd summer, spending the winters deeper in the soil. Pupal stage, in earth cell, 3 to 10 inches underground, about 3 weeks in August or September.
FOOD AND BEHAVIOR	Food, of adults, pollen of flowers, such as *Spiraea;* but of the larvae, it is usually materials valuable to man. Adults found in spring and winter on ceilings and windows attempting to escape to out-of-doors. Both adults and larvae tend to congregate at different places.	Adults of some stag beetles are attracted by light and this, accompanied by the buzzing produced in flight, often brings startling results to summer campers inexperienced in their ways. The adults may feed on decaying wood or on plant juices, some favoring particular species of plants.	Fabre and others have written extensively on the habits of these beetles. Some attribute the ball rolling to one sex, some to the other, and some consider that both participate in its making and care. Some species do not make dung balls, but lay the egg in a nearby dung-packed hole.	Food, plant material, through 3 years of life cycles. Adults feed at night on tree foliage, returning to hide in soil at daybreak. Adults feeding may sometimes be heard. Different species have plant preferences at different ages. Grubs have important bacterial enemies, and are eaten by some animals.
ECONOMIC IMPORTANCE	Control is by keeping adults from laying eggs on valuable property, by using wool baits from which adults may be destroyed, by use of sulphur fumigation, and kerosene in cracks where larvae or adults may hide, and by destroying infected materials where this is possible.	Stag beetles are rarely abundant in sufficient numbers to be considered as serious pests, and since the food of the larvae is largely of already decaying wood, they may be considered as useful in reducing unproductive tissue, thus making room for new growing material.	Egyptians considered the sacred scarab symbolic of the Resurrection, in which life came from death. They also considered the ball representative of the earth and the beetle of the sun with its rays represented by the peculiar leg flanges. Roman soldiers wore sacred scarabs set in rings, because of faith in their power as charms.	May strip trees of their leaves, grass sod of its roots, and may completely destroy such crops as potatoes, small grains, buckwheat. Control, by crop rotation, by deep fall plowing, by pasturing pigs, chickens in infested fields, by use of decoy lights to attract adults to traps, and by protecting crows, blackbirds, and skunks.

ROSE CHAFER *Macrodactylus subspinosus*	JAPANESE BEETLE *Popillia japonica*	ASPARAGUS BEETLE *Crioceris asparagi*	COLORADO POTATO BEETLE *Leptinotarsa decemlineata*	CHESTNUT WEEVIL CURCULIO *Balaninus rectus*
Length, 3/8-inch. Slender but tapering at each end. Body, brown, thickly covered with a fine, yellow fuzz giving the animal a yellowish color sometimes. General color, gray brown. Legs, long, slender, pale red. Actions, awkward and ungainly. Antennae, relatively short and knob-ended. A definite constriction in front of wings.	Length, about 1/2-inch. Shining green body, with white spots on the end of the abdomen behind the end of the wings. Popularly described as a green potato beetle. Larva, like small white grub, and sometimes known as the green Japanese beetle.	Length, about 1/4-inch. General color, bluish-black, often tinged with green. Inner margin of wing-covers, blue-black, but tip orange with yellowish-white and blue-black design between. Thorax, usually red, with 2 black spots near the center. Antennae, moderately stout. Red on the legs.	Length, adult, under 1/2-inch, and about 2/3 as wide as long, with high, arched back. Clay yellow, with 10 conspicuous, black lines on the wing-covers. Head, with a black spot above. Larva, dull, brick-red, soft, fat, and with a row of dark spots down each side.	There are a number of similar and closely related nut weevils of which this species is representative. Adults are usually from 1/4- to 1/3-inch long, generally yellow with darker markings and with long, slender snout that bears cutting jaws at the tip. Snout is approximately 1/2 the total length of the insect.
Family Scarabaeidae. Relatives include the dung beetles, June beetles, Japanese beetles and rhinoceros beetles. This species widely distributed from Maine to Georgia and west to New Mexico and Colorado but most abundant in the northeast in this area. Listed in Kansas as not common but present.	Family Scarabaeidae. A native of Japan that was discovered in New Jersey in 1916 and has since spread over a wide territory. In the first 8 years in America, it appeared in an area of over 2500 square miles and still was not under control. Often so abundant that 1500 grubs may be found in one square yard of sod.	Family Chrysomelidae. About 1000 species in the family in America. This species ranges from Massachusetts to North Carolina and westward through Canada and Illinois having been introduced on Long Island about 1860, and in California about 1904. It is also known in the Rocky Mountain States.	Family Chrysomelidae. Found mostly on potato plant, but originated on the buffalo-bur, *Solanum rostratum,* native of the Rocky Mountain area. Began to spread from that area in 1859, moving at first at about 50 miles a year and reaching the Atlantic Coast about 1874. Adults may be found hibernating in the ground.	Family Curculionidae. In the family are many important snout beetles, weevils, leaf rollers and the apple curculio as well as the billbugs and grain weevils. Most have rather specific food preferences that limit range, but many are more cosmopolitan in food and territory. Cotton boll weevil is possibly the most famous.
Beetles leave ground as grapes bloom, feeding on flowers of many important plants and destroying fruit. Eggs laid in soil to depth of 6 inches, in pockets containing about 12 eggs. Eggs hatch in 2 to 3 weeks into 1/8-inch, whitish grubs, with yellowish heads and dark brown jaws, grubs mature by November. Pupate for 3 to 4 weeks.	Tiny, white eggs are laid usually in uncultivated soil, in July or thereabouts. The white grubs that hatch from these feed through the summer, spend the winter deeper underground, enter the pupal stage for a short time in the spring, emerge as adults in June and July, mate and feed for 2 months or more, causing great damage.	Adults come from winter hiding in brush or under bark, and attack tender asparagus shoots, laying 2 to 8 1/16-inch eggs in clusters. Eggs hatch in 3 to 8 days. Gray-headed, black-legged grubs mature in 10 to 14 days at 3/10-inch length, fall to ground and pupate under ground for from 1 to 2 weeks. Egg to egg in 3 weeks.	As soon as potato plants appear above the ground, fertile female potato beetles lay their masses of yellow. 1/14-inch eggs, usually beneath the leaves. These hatch in about one week into red larvae that grow for 2 to 3 weeks before pupating underground near the potato plants. After about 2 weeks, adults emerge and the 2nd generation starts.	Adults usually leave ground in early spring but continue coming out for some time. When nuts have developed sufficiently the husk or bur is penetrated and punctured with long snout, and eggs are laid inside the fruit. Larvae develop in fruits until they fall, then eat their way out, and winter in the soil where they pupate.
Adults may be killed by baiting with molasses poisoned with lead arsenate. Vines are sprayed with 8 pounds of lead arsenate to 2 gallons of molasses to 100 gallons of water. Larvae may be controlled somewhat by cultivation and crop rotation but even then with difficulty because of range of diet.	Food, of larvae and adults, many kinds of cultivated plants, favoring grapes, raspberries, blackberries, strawberries, apples, cherries, corn, clover, soybean, rose, hollyhock, elm, birch, linden and many other valuable kinds of plants. When feeding in great numbers, they may leave nothing green growing.	In North, there may be 2 generations a year; in the South, 4 to 5. An hymenopterous chalcid fly is parasitic on the asparagus beetle eggs and larvae, and serves as an excellent check, each infected larva being capable of producing to 10 parasites. Poultry destroy many adults when present.	Food, of larvae and adults, plant tissues only, and preferably potatoes and associated plants. Tomato and eggplant may sometimes be attacked as vigorously as are potatoes, and there is no growing season of the plants when the beetles may not be in active destructive condition.	Larvae do serious damage to fruits of plants of use to us as food and for fiber. In the case of the cotton-boll weevil the insect forced a new pattern of agriculture on an extensive area in the South by making the single crop technique too dangerous to follow. The injury may be real as well as merely affecting market values.
One of our more destructive insects but worst on light sandy soil, which the female favors as an egg-laying site. There is usually one generation a year. Insects are characterized by a persistent mating habit in which male may cling to female even when she goes underground to lay her eggs.	Control by burning trash, and by use of a strong spray, at least 3 pounds of arsenate of lead and 2 pounds of flour to 50 gallons of water, though peaches will not survive this spray. Some parasites have been introduced that will probably provide the best pathway of attack, and may eventually provide adequate control.	Adults may be poisoned by lead arsenate paste. Infected plants should be burned. Clean cutting of shoots early in season may interfere with early broods and limit crop of the year. Plants may be dusted with land plaster. Hens, 30 to 40 per acre, should care for a normal infestation.	Natural enemies include crows, skunks, rose-breasted grosbeaks, toads and numerous insect enemies. Usual artificial control is by dusting with Paris green, usually mixed with 10 to 20 parts of some inert material, or used as a spray, or lead arsenate is used as a spray.	Nut weevils may be controlled somewhat by fumigation of clean harvested crops, with carbon bisulphide. Interesting to entomologists because of the appropriateness of their structure to the nature of the plant in which the eggs must be laid or the food procured, representative of some of the niceties of Nature.

In some of the engraver beetles, we find a male building a sort of private love nest or retreat under the bark of some suitable tree. When conditions are to his liking, a female enters and eventually lays her eggs in the walls of their common retreat. In some cases, the female may leave, only to have her place taken by another, which eventually leaves her contribution to the next generation in the walls of the nest prepared by the gay blade. As the young of mixed parentage hatch from the eggs, they begin to eat their way between the bark and growing wood tissue, making tunnels larger and larger as their girth increases. Eventually, they form pupae at the ends of the divergent trails, break their way to freedom through the bark and no doubt live lives comparable to those of their parents.

You no doubt have seen these burrows of the engravers when you went to make a fire in the woods. You picked up a piece of wood that may have looked as though it had been pierced with shotgun pellets. When the bark peeled off, you saw beneath it what may have looked like a long-bodied spider with many divergent legs that were smallest where they left the parent cavity. You know now the story of how this spider-like engraving was developed.

Varied and ingenious as the life histories of beetles may be, man has repeatedly discovered ways in which they may be broken down and the creatures brought under control thereby. Most of us as youngsters have had the experience of being assigned the boresome job of picking potato beetles off the potato vines. This is a rather direct means of attack, but it is rarely thorough and hardly practical on a large scale.

Of course, you all know of the practice of using poison to destroy some kinds of beetles. Usually, this is a stomach poison that is taken in with plant tissue that the insects chew. Such poisons have little effect on the true bugs, which merely pierce the poison film and feed nonchalantly from the hidden plant tissue. Some beetles seem to have a sense of taste and have been known to avoid some of the poisons set to accomplish their doom. Man steps in in such a situation and diabolically adds a little molasses to the poison so that the beetle will eat what is not good for him.

Not a few of the beetles are attracted by light, as you may well know. You have no doubt heard June beetles crash against the screens covering a lighted window in early summer. Also, you have examined the bowls under ceiling lights in your home and found therein dead beetles whose penchant for the great white way was too much for their own good. Again, you have seen the click beetles on the ground under a street light or a porch light. They spin around on their backs and suddenly spring into the air only to alight on the right side. These click beetles and these June bugs are in themselves not serious pests, but their larvae do tremendous damage burrowing under ground, sometimes for as much as three or more years.

Since many beetles have rather specific depths in the soil at which they spend critical times in the year, man often helps destroy them by plowing or cultivating, so that the beetles or grubs are exposed to freezing, or to the attacks of crows. This system calls for an understanding of the life cycle of the trouble maker, and an integration of effort with that knowledge so that the life cycle is broken.

Sometimes it is just as simple to control some beetles by changing the crops grown on a piece of ground so that suitable food is not available for a period long enough for the animal to complete its life story. Crop rotation is often planned to help in a situation such as this, just as it is planned to meet the needs of soil management.

Almost the reverse of crop rotation is represented by the practice sometimes of providing what seem to be suitable resting quarters for beetles that have regular movements from place to place at regular times. If a beetle has the practice of seeking cover under a board in the heat of the day, or the chill of the night, a board properly placed may serve as a gathering place for such insects. Once they have established themselves in apparent security, they may be destroyed by removing the board at the proper time and taking care of them in any way that seems convenient.

In recent years, economic entomologists have carried on their warfare against some of the beetles that burrow under ground by using another method. We might call this honestly biological warfare. Possibly, men may come to use somewhat similar techniques if we have another war, although we hope that this is not to be. In the warfare against the beetles to which I refer, we know that some of our white grubs show dark areas to the rear. Some of us who have used them for bass bait have noticed that some of them give off a white milky juice when they are pierced by the hook. Such insects may well be infected with a bacterial disease that will kill.

Men who know this have discovered that the bacteria may be so placed that they will infect an abnormal number of the grubs. In some cases, it is the practice to mix the bacteria with some substance that will spread it widely. Some kinds of dust are most suitable for this purpose. Then, the infected field is sprayed with the bacteria-infected dust and the healthy grubs come in contact with their little enemy.

Probably the most subtle and intelligent practice for controlling beetles is by encouraging their natural enemies to be present. Skunks were first protected by law in New York State because of the service they rendered in destroying a borer that interfered with the hop crop. Crows have been found stuffed to their throats with the grubs of beetles that would have killed the corn if the crows had not killed the grubs. And, in addition to this, those who know their insects are able to encourage the little parasitic wasps and flies that normally live on the larger beetles or their larvae.

And so we come to a point where we must leave you to your own devices for further studies of the beetles. We should have given you more than enough leads by now.

NOTE: To help you identify the poets mentioned earlier we give you this little directory. James Whitcomb Riley wrote about how the beetle "booms"; Longfellow about its "mail". Shakespeare, of course, used the beetle to show "the matin to be near", and Lowell watched their lights pulsating in the meadow. Tennyson associated the fireflies with the Pleiades, and Coleridge got the sex right when he had the firefly light "her love torch".

The Light Breaks Through

OUR PLUNDERED PLANET by Fairfield Osborn, published by Little, Brown and Company, has been widely acclaimed by reviewers, and has been selected for distribution by the Book Find Club.

Road to Survival by William Vogt, published by William Sloane Associates, has been selected for distribution by the Book-of-the-Month Club, thus assuring a reading audience of at least a million people.

These are statements of fact; of themselves, perhaps not significant. Yet within these two publishing events lies a significance of tremendous importance. Twenty-five years ago—even ten years ago—it is probable that neither of these books could have found an audience with any commercial publisher. Certainly they would never have been chosen for widespread distribution by business organizations that seek to provide their subscribers with what they regard as the best and most important in current books.

Fairfield Osborn is president of the New York Zoological Society, and an active conservationist. William Vogt is a lifelong conservationist, an authority on the conservation problems and future of Central and South America, Chief of the Conservation Section of the Pan American Union, and Secretary-General of the coming Inter-American Conference on Renewable Natural Resources.

These two men are writing about the conservation of natural resources. They are by no means the first to write, and to have published, books on this subject. A rather considerable library of such volumes has been built up during the past half-century, but the majority of such texts have been written largely for an audience of convinced conservationists, or in the hope that they will be used in schools and colleges as textbooks. No book on this subject has thus far achieved more than a minor distribution, however excellent many of them have been.

In the past, educators have agreed that the conservation and wise use of our natural resources are important, but only to a minor degree have they exerted any effort to see that the rising generation be given an opportunity to learn of that importance. School curricula, they have pleaded, are already overloaded; conservation will have to edge in by way of passing attention as a part of social studies, geography or science courses.

Popular magazines have now and then nibbled tentatively at the edges of the subject. More often their editors have avoided it as either too controversial, too recondite, or too undramatic to appeal to their readers. Book publishers have been largely equally hesitant.

In the meantime conservation organizations and informed individuals have kept on telling their story, gaining friends here and there; an educator now and then; space in a general magazine once in a while. Depression years brought wider public acceptance of the word *conservation.* The Civilian Conservation Corps introduced it to many; the Soil Conservation Service explained it to more; the Dust Bowl provided drama. Finally World War II left a world in which millions verge upon starvation—or actually starve—for lack of the products of the soil, in which resources have been squandered; in which we must learn to conserve and build up whatever resources remain.

Truly we live upon a plundered planet, and, verily, we must find the road to survival. Fairfield Osborn and William Vogt point to that road.

It is not our intention here to review either of these books. That will be done elsewhere in these columns. Rather do we wish to emphasize the wide importance of both publications, and to bespeak for them an audience of millions. Also, we wish to take a bit of credit due the conservationists, who, through the past half-century, have kept doggedly at the missionary task, which we are certain has gained sufficiently in converts to make the publication of these two books not only a good publishing risk but a responsibility.

Fairfield Osborn's book is dedicated to "all who care about tomorrow." Commenting on it, Robert Maynard Hutchins, president of the University of Chicago, says that as an educator he is "interested not only in tomorrow but in the day after tomorrow. As an inhabitant of the planet Earth, and as an inheritor of the kingdom thereof, I am also interested in yesterday and the day before yesterday, and in the outrageous and reckless behavior of my ancestors. It seems that you and I have inherited a plucked goose."

Dr. Hutchins offers a program and ventures a prophecy, saying:

"The program is that every reader of this book shall refuse, and encourage others to refuse, to vote for any candidate for public office who has not pledged himself, within the limits of the function of the office to which he aspires, to apply the principles enunicated by this book, to public life.

"My prophecy is that, if every reader acts upon this suggestion, within five years the thinking of statesmen in every country of the world will be changed—and that the next generation will have at least a reasonable hope for the good life."

This would presuppose that every aspirant for public favor would have to read this book—and Mr. Vogt's. If they are worthy of holding public office that should be sufficient, for such is the message both volumes emphasize.

In his ninetieth year he went alone on a field trip in search of varieties of tropical palms; when his eighty-ninth birthday rolled along he was in an airplane flying back from a collecting trip in South America; he is saving "an easy trip" to Africa until "I get old", for——

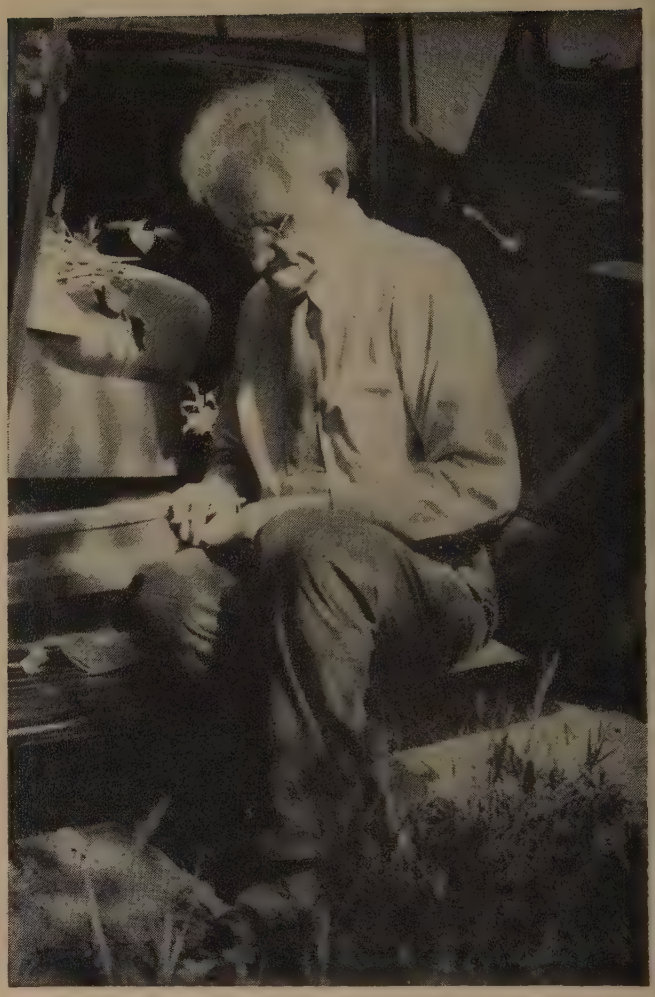
Liberty Hyde Bailey Is Ninety Years Young

By ANDREW S. WING

THIS is a story about a famous man of whom a great many have heard. Hundreds of thousands have read or referred to his books, yet to many he is just a name. But the fact is that, at the time this was written, he was, at ninety, one of the liveliest persons in the world—livelier than most of us will be at seventy.

Liberty Hyde Bailey passed his ninetieth birthday on March 15. The actual dinner given by his friends at Cornell University, where he has been living in retirement since 1913, occurred after his return from the West Indies on April 29. Just what took place at the actual birthday party could not be foretold as this is being written. Last year he spent his eighty-ninth birthday on a plane flying back from South America. Dr. Bailey, or "Dean" Bailey, as he is known to many of his old friends and former students, takes little stock in birthdays. He is too much interested in carrying forward his lifelong work of collecting and studying plants, particularly palms, to care about the fuss and folderol of a birthday celebration. Last winter, as usual, he took off for the swamps and jungles of tropical Latin America. He did it alone this year, although on his more difficult journeys into the Amazon, and other distant regions, he usually has a party of natives to help him.

The first time I met Dr. Bailey was at his Hortorium in Ithaca, New York, during the early days of the Roosevelt Administration. I had just returned from Washington, and I gave him a personal view of what Franklin Roosevelt and Henry Wallace were trying to do to improve the agricultural situation through the Agricultural Adjustment Act and other measures. It was refreshing to find that the veteran educator and former chairman of the Country Life Commission, created by the first Roosevelt, was just as alive to the trends of the times, and what the New Deal might hold in store for the farmer, as one who was



Liberty Hyde Bailey on a collecting trip.

close to the political firing line. In fact, I cannot remember a more stimulating interview, with the possible exception of a long talk with Henry Ford, Sr. in May, 1925. There was, and is, nothing academic or stuffy about this genial old gentleman, who has done so much to create the modern agricultural college, who has edited or written more than 100 books, including the monumental and still standard *Cyclopedia of Horticulture*, and whose prose style is at least the equal of any living garden writer today.

The next time I saw Liberty Hyde Bailey was some years later, at the time of a Men's Garden Club convention in Syracuse. We were taken on a motor pilgrimage to Cornell, one of our truly fine horticultural institutions, and the high spot of the program was an address by Dr. Bailey. Most of us, I am sure, merely expected the veteran plantsman, then in his eighties, to rise, make a bow and utter a few words about how glad he was to see us, and so on. Instead, he delivered as fine a talk, without script, as one would wish to hear, standing straight and tall, a bit gaunt, but impressively dynamic, eloquent, and with a nice bit of humor. I am sure that no one who was present will soon forget that dramatic moment in a very interesting day.

What goes to the making of a man like Liberty Hyde Bailey? One has to hark back to the pre-Civil

War days to a humble farm home near South Haven, Michigan, to study his beginnings. He likes to tell of the school teacher who helped to open his eyes to the wonders of the world around him. In a region where there were still more Indians than white people, he felt that he knew everything in the woods. But one day, when he asked his teacher if she would give him a course in Nature study, she said, "Liberty, I'm sorry for you, sorry to see you going through this beautiful world with your eyes shut!"

When he disputed her, she replied, "Tell me how many apple trees there are between your home and the school."

He did not know, but he counted them the next day, and told her. Then she asked, "How tall are they?"

He did not know that, either, but he did the next day, and told her. This little game of questions and answers went on for what he calls "a blessed year. Observation of all plants and animals became a part of my life. It means more to me now than ever before. If we are to inhabit this planet, we should be sensitive to it."

This has probably been the guiding philosophy of a long and useful life and career. But mere observation, scientific study and research never have been ends in themselves. It is the relation of basic facts to human existence, the essential goodness of the earth, and what living on the land means to people, that has always, I feel, been uppermost in his consciousness.

The Liberty Hyde Bailey Medal awarded by the National Garden Institute to boys and girls who have made special contributions to horticulture.

Dr. Bailey's closest friends assert that he is deeply religious, not in a narrow or orthodox sense, but in his feeling for the world around him, and also, I am sure, in a strong inner belief that there are forces in the universe that are more powerful than material things, and which no scientist can explain or fully understand. This, of course, does not make Liberty Bailey unique among the great scientific men and philosophers of the world, for many of them have the same faith in a directing force or spirit.

The yearning for more knowledge drew young Liberty Hyde Bailey to Michigan State College, then a small institution. After graduation, he studied for a time under Asa Gray, the noted Harvard botanist, and then returned to Michigan State, where he was appointed professor of horticulture and landscape gardening. This was the first college department of horticulture in the United States. In those days, gardening and horticulture, like farming, were learned mostly as a trade, not studied in college halls. It is hardly necessary to say that Liberty Hyde Bailey is revered as a most distinguished alumnus, almost a patron saint, at Michigan State, where a building has been named in his honor.

The young botanist and educator soon turned his face eastward, where a larger opportunity was offered at Cornell University, in 1888, as professor of horticulture. His distinguished record in that post brought him the deanship of the College of Agriculture in 1903. There he soon demonstrated such an ability as an educator and an administrator that his leadership was considered revolutionary. For one thing, he reached after state funds for agricultural education, and the Cornell College of Agriculture became the New York State College of Agriculture, with both State and Federal support. He instituted, for example, the first dairy department in any college. And when a young instructor suggested a department of plant pathology, he said:

"I never heard of a professor of plant pathology."

The young instructor said he never had either, but he thought that the importance of the study of plant diseases justified an appropriation for that purpose.

"Do you think you can handle it?" the dean asked.

"I do," replied the instructor.

"All right," said the dean, "you are now a professor of plant pathology. Go to work."

Under his guidance the plant of the "cow college" at Cornell grew from a $60,000 to a $1,000,000 institution, thanks to his ability to demonstrate to the New York State legislators, many of them farmers and dairymen, that an agricultural college education was a good thing for the State. In 1908 he helped to organize the New York State College of Home Economics, one of the leading institutions for homemakers in the country, and which now includes even a course in hotel management.

By 1913 Dr. Bailey decided it was time to "retire" and let others take over the reins. He would devote the remaining years of his life to doing the things he had always wanted to do. He was then fifty-five years old, and in the prime of life. One of his first projects was to found the Bailey Hortorium, which is housed in a glass-sided workshop adjoining his

residence in Ithaca. There is housed his collection of more than 150,000 plants. His daughter, Ethel Zoe Bailey, is one of those in charge of this important collection. She was trained by her father for this task and he considers her so valuable that he will not take her with him on his plant exploring trips for fear "something might happen to her"! The Bailey Hortorium was deeded over to Cornell in 1935.

While carrying on his extensive plant hunting and botanical studies (he is considered a leading world authority on the palms) he found time to edit the well-known Farm & Garden Library of The Macmillan Company. His best known work is probably the *Standard Cyclopedia of Horticulture*, without which no horticultural library is complete. Also well known are *Hortus* and *Manual of Cultivated Plants*. Less well known, but important to all Bailey followers, are several small books of essays, into which he has poured, in poetic prose, his philosophy of gardening and country living. Liberty Hyde Bailey's most important philosophical work, *The Holy Earth*, was recently reprinted in several languages by the Christian Rural Fellowship for distribution in foreign lands. In all, the works he has edited or written total about one hundred, not including the many scientific monographs on the palms and other plants.

When not otherwise engaged, Dr. Bailey likes to dig in his own garden. Each year he makes a study of some single group of plants by growing, for comparative purposes, all of the kinds of which he can find seeds. One year it may be gourds, the next pinks, and so on. To him all plants are interesting, and, in some way, useful or beautiful. He does not share the passion of those who must have only the latest hybrid rose or iris, ignoring the many beautiful things that Nature has provided.

In 1941, when I was editing *Garden Digest*, he wrote at my request, and it was printed in the magazine the same year:

"The earth was prepared for man; and thus does man enjoy his heritage. Millions of folk will come after us, in other days. Yet their day will be as new as ours, and not worn out. The grass will be as green and as eager as ours; May will shout with joy of new growths; July will nurture crop and tree; September will produce the seed after its kind.

"Century will follow century. Fragrant lives of men and women will be lived, like poems. As we, in our golden age, plant the seed, experience the unfolding of leaf and flower, feel the confident hope of harvest, so will they, in their time, be born again with every new day. As centuries pass, men and women will care less merely for gaudy creations of the hybridizer and will wish to live more closely with plants as Nature made them."

Orchard

By DANIEL SMYTHE

Our friend, the botanist, said this to us:
"I note the carpels are perigynous;
And where such photosynthesis takes place,
The chlorophyll ties up a lot of space.

"Now take a leaf: stomata show at last
Across the regions of the chloroplast.
And mesophyll and cells of palisade
Are lined like sponges upon every blade.

"Or take the floral axis, receptacle—
It has no endocarp that you may tell.
It has live cells, but not a chromosome,
A sporophyte that's better known as 'pome,'

"And what are roots? Rootcap, promeristem,
O miracle of periderm and phloem;
In every case we know the bundles are
Certainly long and wholly vascular."

He paused; I looked, but what I saw was slight;
High branches shouldering packs of fruit and light;
Acres of shining trees where winds carouse
Held up the treasure of their laden boughs.

The original of the above is framed and standing on my garden bookcase beside an autographed photograph of the author. Studying the latter, I note the large head, the hawk-like nose, the mouth firm, although a bit shrunken and deeply wrinkled, the whole being surmounted with a shock of snow-white hair. A tall man, Dr. Bailey still holds himself erect, and as he peers at you through his glasses you get the impression that he somewhat resembles another great son of the Middle Border, Abraham Lincoln.

Many stories are told of Liberty Hyde Bailey, some of which originated with himself, for he has a genuine sense of humor. At a banquet given in his honor in Cuba, his host offered him a cocktail. This he refused, although he has been known to take a glass of wine. His host, a Cuban, then offered him a cigar. This he also refused, much to the bewilderment of the native, who asked, "Why, Dr. Bailey, don't you have any bad habits at all?"

Dr. Bailey laughs when he tells this story. And to show that he is not a prude, when once asked the secret of his longevity, replied: "I could claim that it is because I neither drink nor smoke. However, I should also point out that both my parents lived to a ripe old age."

An amazing constitution and a great spirit both must contribute to his ability to achieve the feats of endurance that he goes through on his travels. These trips have taken him to China, into the jungles of the Amazon, through the islands of the Caribbean, and into Mexico. In 1943 Dr. Bailey covered 6000 miles of Mexican wilderness in seventeen days, mostly, of course, by airplane. He (Continued on page 332)

Animal Accidents In Geyserland

By MILDRED J. ERICSON

YELLOWSTONE National Park is a famous wildlife refuge, but some of its animal residents meet violent deaths every year because of the pitfalls of this colorful geyserland.

A large bull elk was discovered in April, 1947, dangling in mid-air in a narrow but deep, old hot spring crevasse, hanging by his antlers, which were firmly wedged to the rock walls. This unusual mishap was discovered by Park Ranger Naturalist George D. Marler in the Upper Terraces at Mammoth Hot Springs in the northern area of Yellowstone Park.

Snow had covered the rift, and had leveled the landscape into one sheen of whiteness, completely hiding the pitfall. In searching for food the elk slumped into the trap, hind feet first. He was wedged into his tomb in a vertical position. It appeared as if he had reared and had attempted to climb out, but the narrowness of the crevasse prevented escape.

Later in the season the carcass fell through to the bottom of the ten-foot crevasse, Coyotes then made frequent raids on the dead elk. Tourists visited the cervine king in his stony sarcophagus on conducted trips led by the ranger naturalist out of Mammoth Hot Springs. Two other elks are known to have stepped into death in this crevasse in the past fifteen years.

If the birds could read, Yellowstone ranger naturalists would place this sign, BIRDS, BEWARE! DANGER! beside "Poison Cave" near Orange Spring Mound at Mammoth Hot Springs. Here is a cold-water pool where carbon dioxide bubbles at the surface of the algae-coated water. Birds in search of water die here as the result of inhaling carbon dioxide fumes. Although carbon dioxide is not a poisonous gas, when it is inhaled it forms a cell block in the respiratory system, preventing oxygen from entering the body. The animal then dies of suffocation.

One day last summer I discovered twenty-six birds dead at "Poison Cave." Coyotes, knowing of this death-pit, make nightly visits to devour the birds that have met their fate that day.

Among the species of birds that have met death at "Poison Cave" are Rocky Mountain screech owl, evening grosbeak, green-tailed towhee, Townsend's solitaire, western robin, Cassin's purple finch, Lincoln's sparrow, western chipping sparrow, and a number of warblers.

PHOTOGRAPH BY DAVID DE LACY CONDON

Winter tragedy in Yellowstone. Falling into an old hot spring crevasse, this bull elk was wedged by its antlers. Two other elks died in this way.

PHOTOGRAPH BY THE AUTHOR

Coming afoul of a telephone wire, probably sagged by the snow, a bull moose became hopelessly entangled, winding fifty yards of wire about its antlers.

An isolated telephone wire meant death for a moose last spring. A large bull was found with about fifty yards of heavy, number nine, steel telephone wire wrapped around his skull and antlers. A piece of tight wire at the base of his skull no doubt caused his death. The telephone line was connected to one of the remote snowshoe cabins used by the rangers in the Thorofare country. Heavy snowstorms probably caused the slumping of the wire. This wire-wrapped moose skull and antlers were found at Trail Creek, near the south arm of Yellowstone Lake. National Park Service officials plan to place the skull in the Old Faithful Museum garden.

"Buffalo Spring" in the lower geyser basin was so named because buffalo bones were found there. If the crust of rock surrounding the spring were strong enough to hold a man's weight, one could still see the remains of the buffalo below.

An elk fell into a large hole near the Lake Hotel last July. The rangers secured the services of a wrecker to hoist the animal out of the hole, after which it ran off as though nothing had happened.

Four bears were killed by automobiles driven by the tourists last summer, which is not surprising considering what happens to humans every day. The calamity that caused demise of a twenty-pound, forty-six-inch ot-

ter near Obsidian Creek was never determined. The most violent death was met by a dog, a pet of one of the tourists. The dog jumped into a near-boiling pool. His death was instantaneous. His owners had ignored the National Park Service rule that dogs must be kept on a leash.

An unfortunate disaster claimed some of the Yellowstone buffaloes, two winters ago. Migrating from one part of the park to another, a herd of buffaloes crossed the Yellowstone River about five miles north of Yellowstone Lake. The ice on the river was covered with four feet of snow. Under the pressure of some twenty tons of weight the ice collapsed and thirty-eight buffaloes drowned. The leaders of the herd, however, had crossed successfully, as evidenced by tracks on the opposite shore.

This strange kill was first discovered on February 14, 1946, when a ranger on patrol discovered nine animals frozen in the ice. The patrolman on March 7 counted several additional animals where the channel was open. The animals' bodies were scattered along three miles of Yellowstone River.

It was May before all the ice was out of the river, thus permitting the removal of the huge carcasses. This was no easy job for the National Park Service rangers. It was accomplished by a 60-horse-power tractor-bulldozer, a winch truck, rowboat, several hundred feet of lines and miscellaneous tackle.

Then the rangers pondered the burial problem. Finally a tractor-bulldozer was used to scoop out a large pit beside the river, close to the place of the tragedy. The remains of the thirty-eight buffaloes were laid to rest, and the grave was levelled smooth. It did not remain that way long, however. Grizzly and black bears soon smelled the foul flesh and investigated. Nightly they visited this cemetery throughout the summer. The bears have exposed much of this unusual grave. Hoofs, skulls with horns, large thigh bones and fur lie along the river bank. Even if the skeletons were re-covered daily the bears would expose them each night.

A minor but tragic casualty in Yellowstone Park the past summer was the death of three trumpeter swan cygnets at Swan Lake. The trumpeter swan is one of the rarest birds in North America. A few years ago ornithologists feared this large, all-white swan would become extinct. Strict conservation laws were enforced to protect this beautiful bird in the few areas of the West where they were known to nest. Of the 350 trumpeter swans in North America, sixty-two of these were counted in Yellowstone Park last August in the annual swan-census.

PHOTOGRAPH BY THE AUTHOR

A projected trip to Grasshopper Glacier had to be abandoned when two of the horses became mired, neck-deep, in a marshy pond. They were finally pulled to safety by a team of their fellows.

Usually extremely shy, a pair of these swans built a nest adjoining Swan Lake, which is clearly visible from the main loop road. Three young hatched, and the down-covered cygnets could be seen following their parents over the azure water of Swan Lake any time of the day. When the cygnets were ten days old they disappeared. The adult swans are very pugnacious and violently fight any enemy, so the cause of the catastrophe that befell the cygnets is indeed a mystery.

A rather serious animal accident was observed just outside the northeast entrance of Yellowstone Park near Cooke, Montana. A group of us had made arrangements to ride horses to Grasshopper Glacier. When we appeared for our trip the wranglers reported the horses were not ready because one of them had been missing for several days. Finally the horse was found—up to his neck in a quicksand swamp a mile away. Only his head was above the surface. One of the horses the wranglers brought down also got stuck in the mire. Fortunately, however, both animals were rescued by a team of horses that pulled them to safety to the relief of all concerned.

★

Tidewater Sunset

By ALBERT WARNER DOWLING

Along the river road the cat-tails kneel
As sunset breeze blows out the lights of day;
Where God has placed his color-crusted seal
On sky and creek, the marshgrass bows to pray.

An arboreal queen, its origin shrouded in tradition, its canopy of leaf and limb having camouflaged Robert E. Lee's tent, there is rare beauty in—

The Cucumber Tree at Violet Bank

By CHARLES EDGAR GILLIAM

CALIFORNIA has redwood forests; Louisiana, live oak lanes. Violet Bank has only one cucumber tree, but it is an arboreal queen! This giantress has been pilgrimaged to and "*Ah-ed*" over these past forty years by laymen, foresters and botanists. Scientists pronounce it an unusual *Magnolia acuminata.*

The species is not classed as indigenous to tidal Virginia. Authorities estimate its average life-span at about one hundred and thirty years. Yet this specimen suckles and shades its circle of good earth as if in its native habitat.

Some day its age may be determined. Extant documents about Archer's Hill Tract, reaching back to 1613, do not note this tree. Their silence attests the insensitiveness of busy men, women and children to natural wonders. In the spring of 1864 General Lee camouflaged his tent under its then enormous canopy of leaf and limb. This first focused local attention on it. The curious began to seek records of its planting.

Unpreserved verity is often vouched by traditions. Some, romantically, say a returning Knight of the Golden Horse Shoe brought the seed from the Shenandoah Valley in 1712. The prosaic claim Dr. John Gilliam planted a seedling in front of the classic guest house—now home of the American Legion—which he built, *circa* 1830. We hazard that Thomas Shore set it out about 1772.

Of all proprietors, however, he left the most vivid testimonials of appreciation of living beauty. He chose a new site for his manor, where Archer's Hill, weary of leaping down granite to bottom lands, strolled towards the willow-scarfed Appomattox beneath ancient beech, poplar, pine, gum, hickory, oak and holly, through smaller dogwood and redbud, over a scented carpet of native white, yellow, blue and purple violets, which still grew in profusion in 1906. No one knows how long it took Nature to tapestry the slope; but when Shore first beheld it he translated it into a new plantation name—*Violet Bank.*

While this magnolia waxed in statuesque loveliness, surrounding acres ceased to rustle with growing crops. But they still support a vital culture—the quietly beautiful city of Colonial Heights, Virginia, on the north bank of the Appomattox opposite Petersburg. One block east of U. S. Route 1 at the end of Arlington Street, enclosed in fence and hedge, lies what is left of Violet Bank—a corner of lost Eden that all may enter through an unclosed gate and surprise a chaste house looking up to an ancient tree in mystic communion.

No wonder visitors can hardly believe their eyes! In a locale sciences as foreign to *Magnolia acuminata,* suddenly one towers seventy feet above, on a spiralling trunk seventeen feet in circumference. Lower limbs with five to seven-and-a-half foot girths sweep buoyantly outward, head-high from the sward, in a great circle one hundred and ten feet in diameter.

Many are adept at classification of seed, bud, leaf, bark; wood-tangibles smelled, seen, tasted, touched, heard, measured and dissected. Often the most gifted find it difficult to understand glimpses of intangibles, of the illimitable continuity of Life—of the mystical whole, of which fish and coral, reptile and weed, bird and flower, bush and beast, and forest and Man are parts.

To walk into the presence of this cucumber tree is to sense the ineffable—to feel the invisible, yet visible eternalness of strength and beauty. For a rapt breath one envisions the past, present and future as an indefinable spirit embodied in this graceful great-great-great-grandmother of vanishing woodlands. Most of us remain incredulous after seeing such things!

We discover that, like Typhoid Mary, we are a menace to the orderly conduct of human existence. In fact, it appears that we are laden with the highly contagious germs of an insidious disease, but a reader who has isolated the germ, and identified it, says—

Let's Have An Epidemic

By JULIA C. JAMES

With Clinical Drawings by the Author

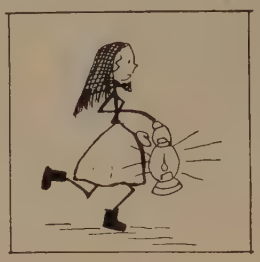
THE other day I received quite a shock. It suddenly occurred to me that I was the victim of a contagious disease that was being spread everywhere by *Nature Magazine.*

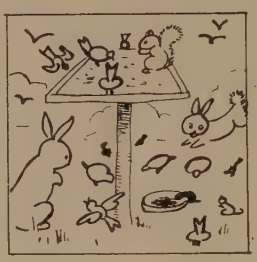
For some time I had been aware that something was amiss, I seemed to have a curious mania for the outdoors, but I had not considered this a serious ailment. However, a day or two ago I found, on the School Page of one of my *Nature Magazines* (May, 1941), an article entitled "A Delightful Contagious Disease." The author said that the ailment, which he called "Amateur Naturalistitis," was highly contagious. In so many words, he said that if one had anything at all to do with people who were enthusiastic about Nature, one would be practically certain to catch it.

I was horrified. An illness with such a sinister name as that must be dreadful, and I was almost certain that I had caught it. In fact, I believed that I knew exactly how and where I had contracted it. It happened this way.

Until a few years ago I was thought to be almost normal. Then, one day when my resistance was low, *Nature Magazine* was brought to my attention. I succumbed to its lure and immediately sent in my subscribing membership. As each number came I read it through, over and over again. I recall that, almost at once, I began to show signs of peculiar behavior. I demanded that a long board, with narrow strips of wood tacked along its sides, be set up on posts outside our kitchen window. I arose before daylight to put on this board a strange collection of items—pieces of suet, an assortment of seeds, grain that I had ground up in an old coffee grinder, and cracked walnuts. On the ground under the board I spread a carpet of sweepings from the haymow. I put a couple of shallow pans of water there, too.

Various kinds of birds came to eat and drink; so did squirrels, meadow mice, and an opossum. On moonlight nights I could see rabbits patronizing my provender, also.





Watching these visitors became an obsession with me. I would sit for hours staring out of the window. I even tried to do my work with at least one eye turned in that direction.

That sort of thing went on all winter.

By the time spring had arrived I could hardly do a lick of work. I wanted to get away from it all. I suffered from claustrophobia. I was simply frantic to get out into the fields and woods. I wanted to go to the orchard to see the bees tumble in and out of the apple blossoms; or to the bridge where I could watch the muskrats and turtles.

I had all kinds of symptoms. My heart would pound alarmingly when I saw a couple of gorgeous rose-breasted grosbeaks cracking corn within reach of my hand. I grew a little feverish when eighteen cardinals came at one time to eat in our back yard. I did not react normally when I saw snakes. Instead or running away or hunting a weapon, I stopped to speak to the creatures.

I became peevish and bossy. From May until October I would not permit a fire to be built in the old-fashioned, wide-throated fireplace because, inside the chimney, there were some little varnished cradles containing chimney swifts. Neither would I let anyone ring the big dinner-bell, which sits atop the house and has its own small roof, because I believed that we had bats in our belfry and they might be disturbed.

I let the house go to rack and ruin. I could not bear to have the hole in the pump-room floor patched. It was the only entrance for some small creature that had painstakingly stored shelled corn in the toes of our rubber boots and galoshes. A board was off the boxing under the eaves, but I would not hear of having it replaced. The juncos were using the little spaces there for sleeping quarters. And I simply would not stand for having the lattice of the front porch mended because that would

prevent the quail from using it as a haven in time of storm, as they had been doing.

I lost all interest in food and seemed to think that just any kind of a meal would do. Occasionally I would set out a skimpy lunch for the rest of the family, while I took a sandwich and sneaked off to the woods.

There I would slink from tree to tree, spying on the flock of hermit thrushes that spent three weeks in the company of our swamp robins. Or, perhaps, I would watch the frogs in the swamp, trying to find out how they blew up their throats into balloons.

At any hour of the night I was likely to prowl up and down the creek just to see what was going on there. Sometimes I would perch on the old rail fence to listen to a conversation between two owls, although I could not understand a word they said.

Without my husband's knowledge, I bought a magnifying glass and roamed about the fields, snooping into the private lives of such small creatures as insects. I brought home caterpillars and canned them, with leaves, in glass jars.

Now, I seem to be entering a new phase of this ailment. I buy notebooks. Some I fill with sketches of snails, toadstools and other things. In other words I jot down details of incidents, such as: A fight between two ants; the song of sparrow babies' first bath; the attempt of some baby skunks to frighten me. At times, when I am a little delirious, I even try to write some verses.

I entice people into my home to watch the finches, and any number of other birds at the feeding board. I nag at them to put up feeding stations of their own. I practically force them to look through the magnifying glass at an insect egg, or an infinitesimal flower, and note with fiendish glee their aroused curiosity. With sly cunning I urge them to read *Nature Magazine*—knowing all the while that this is the sure way to spread the germs of the insidious malady.

I do all these things because—and this is the worst thing of all—I actually want to expose others!

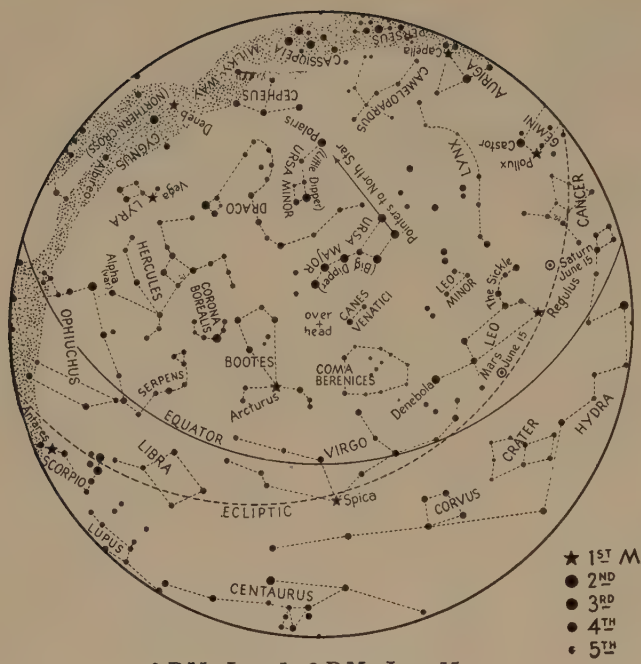
I realize, of course, that I am still in an early stage of this illness, but I hope to progress more rapidly. I enjoy it so much that I want everyone else to have it, too. I am sure that they would agree, as I do, with the writer about Amateur Naturalisititis who says it ". . . is well worth having."

Native Habitat

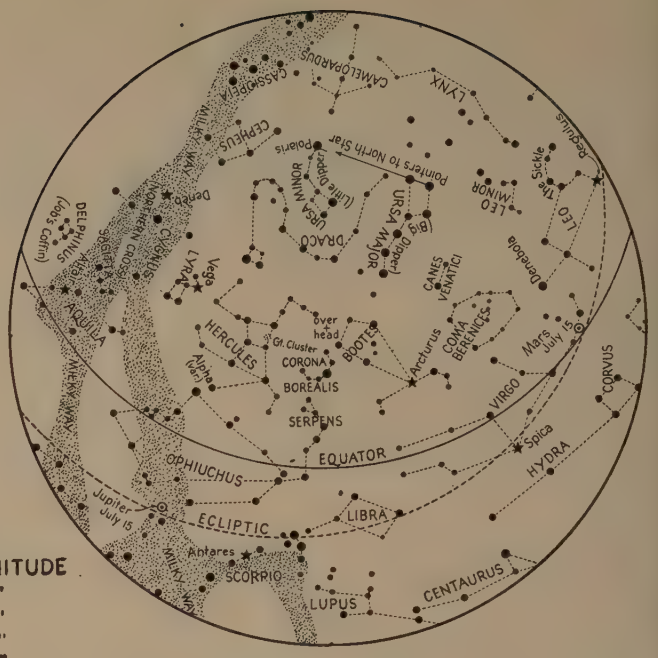
By MABEL IRENE HUGGINS

HAVING seen the following birds and animals at the zoo, you have an urge to travel with the hope of seeing each in its native habitat. Where must you go? For each, three possible places are suggested but only one is correct. Turn to page 332 for the answers.

1. yak	a. Alaska	b. Tibet	c. Brazil
2. kiwi	a. Hawaii	b. Finland	c. New Zealand
3. dingo	a. Australia	b. South Africa	c. Cuba
4. giant panda	a. Paraguay	b. Persia	c. West China
5. giraffe	a. India	b. Africa	c. Australia
6. bird of paradise	a. New Guinea	b. Peru	c. California
7. musk ox	a. Tibet	b. Bolivia	c. Greenland
8. hippopotamus	a. Africa	b. Brazil	c. Burma
9. emu	a. Mexico	b. Australia	c. Japan
10. mandrill	a. Madagascar	b. West Africa	c. Sumatra



9 P.M., June 1; 8 P.M., June 15.



9 P.M., July 1; 8 P.M., July 15.

To use these maps hold them before you in a vertical position and turn until the direction of the compass that you wish to face is at the bottom. Then, below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

June and July Heavens

By ISABEL M. LEWIS

THE planet Uranus has a new satellite, discovered recently with the 82-inch reflector at the McDonald Observatory on Mount Locke, Texas. The tiny object was found on a photographic plate taken on February 15 of this year, and also on two plates taken on March 1. So faint is the satellite that it is not observable visually, even in the largest telescopes, but can be easily photographed with an exposure of two or three minutes.

The four previously known satellites of Uranus are Ariel and Umbriel, discovered by Lassell in 1851, and Titania and Oberon, discovered by Sir William Herschel in 1787. They are among the faintest and most difficult to observe of all satellites, to be classed in this respect with the six faintest satellites of Jupiter, all discovered since the beginning of this century, and all less than 100 miles in diameter, and Phoebe, probably about 200 miles in diameter, faintest of the nine satellites of Saturn. The four historic satellites of Jupiter, as they are called, are Io, Europa, Ganymede and Callisto, known also as Satellites I, II, III, IV, in the order of their distance outward from the planet. They are bodies comparable in size with our own moon; two of them, in fact, are about 200 miles greater in diameter than the planet Mercury, and the other two are nearly equal in size to the moon. These four satellites, discovered by Galileo in 1610, are easily visible in the smallest telescopes, and they are continually presenting phenomena of never-failing interest to the observer, such as eclipses in the shadow of the planet, disappearances behind its disk, and, later, reappearances, as well as transits of the satellites and their shadows across the disk of the planet. All of these phenomena are predicted in advance for the benefit of those who wish to observe them.

Satellite V, nearest to Jupiter of its eleven satellites, is a difficult object to observe because it is so close to the planet, only about 25,000 miles above its surface, and also because it is so small and faint, with a diameter of about 100 miles. The remarkable discovery of this very difficult object was made visually by Barnard at the Lick Observatory in 1892.

The largest satellite of Saturn, Titan, is several hundred miles greater in diameter than our own moon, and is easily visible in the smallest telescopes. Rhea, second largest in size, has a diameter of about 1100 miles. Mimas, nearest to the planet of the four satellites, is about 400 miles in diameter, and skirts around the edge of the outer ring only 30,000 miles beyond it in a period of less than a day. Enceladus, Tethys, and Dione come next in order, small bodies a few hundred miles in diameter; then Rhea and Titan; Hyperion revolves around the planet beyond Titan in a period of about 21 days. It is a small body,

only 300 miles or so in diameter and is at a distance of more than 900,000 miles from the planet. Japetus, which lies next beyond Hyperion, is about 1000 miles in diameter and is about 2,200,000 miles from the planet. It takes more than 79 days to complete one revolution around Saturn. Phoebe, the outermost of the nine satellites of Saturn, smallest of all of them, takes 550 days to revolve once around the planet at a distance of 8,000,000 miles from it. It is noted for the fact that it backs around the planet, or "retrogrades," as it is called, in a east to west direction.

The satellites of Uranus revolve around the planet in periods that range from about 2½ days for Ariel, and an estimated 30 hours for the new satellite, to 13 days, 11 hours for Oberon. The distance of the new satellite from the planet is estimated to be about 0.64 that of Ariel, or 75,000 miles. Titania, the largest, is about 1000 miles in diameter. The newly discovered satellite is probably not more than a few hundred miles in diameter. It is of the 17th magnitude, which is also the magnitude of Satellite IX of Jupiter, and the faintest in magnitude of any known satellite in the solar system. An object of this magnitude is beyond the limit of visibility to the eye in even the greatest telescopes, and is observed only on photographic plates.

It is a peculiarity of the satellites of Uranus that they revolve around the planet in a plane that is tipped nearly perpendicularly to the ecliptic, and in that plane, which is also that of the planet's equator, they back around the planet, or retrograde, as do Phoebe and several of Jupiter's satellites.

Triton, the lone satellite of Neptune, is estimated to be nearly as large as the planet Mercury. It is at a distance of more than 200,000 miles from Neptune and takes 5 days 21 hours to revolve around it.

In actual size the two tiny satellites of Mars are the smallest of all the known satellites in the solar sysem. Phobos, the larger, is about ten miles in diameter and Deimos only five miles.

As the larger and more powerful telescopes explore more thoroughly the regions in the neighborhood of the planets it will not be surprising if additional small satellites will be detected, and the present number of twenty-nine, in all, still further increased.

Among the planets during these two months we find Mercury well placed for observation the first few days in June in the evening twilight. It will be in inferior conjunction with the sun on June 23, passing then to the morning sky. It will be at greatest western elongation on July 16, when it will be a little north of east at sunrise, and should be visible in the morning twilight a week or more before and after this date.

Venus will be in inferior conjunction with the sun on June 24. It will still be conspicuous in the western sky early in June, but will draw in rapidly toward the sun. It will pass to the morning sky on June 24, and will soon be visible in the morning twilight. By July 15 it will rise about two hours before the sun, and it will be at greatest brilliancy in the morning sky on July 31.

Mars will be in the western evening sky during these two months. Early in June it will be a few degrees southeast of Regulus and passes from Leo into Virgo during this period. By the end of July it will be low in the southwest at sunset, and in brightness it will be about equal to Spica, which will not be far distant. The two objects will be a strong contrast in color, as Mars is red and Spica a brilliant bluish-white. Jupiter will be in opposition to the sun on June 15, when it will be visible all night. It will be well placed for observation in the evening sky during these two months, passing from Sagittarius into Ophiuchus in the southern sky. Saturn remains not far from Regulus in Leo during this two-month interval, and forms a conspicuous group with Mars and this first magnitude star, although Mars is now moving rapidly away in the direction of Spica. Saturn will be the brightest of the three objects. Mars, although brighter than Regulus in the earlier part of June, is equal to it in brightness late in June and early in July, but later in July becomes noticeably inferior in brightness.

In June few brilliant stars appear in the early evening. Regulus in the west, Spica in the south, Arcturus near the meridian, Vega in the northeast are the only first-magnitude stars well in view. Jupiter rising in the east near sunset, and Saturn and Mars in the west, help to brighten the heavens, however. The Milky Way is poorly placed in June along the eastern horizon. The heavens become more brilliant in July, with red Antares, and many bright stars in Scorpio, appearing. The Milky Way is now visible in the eastern sky. Deneb in Cygnus and Altair in Aquila, in the path of the Milky Way, shine in the northeast.

On June 21, at 7:11 A.M., *Eastern Standard Time*, the sun will be at highest northern declination in the constellation of Gemini and sign of Cancer, and summer will begin then in the northern hemisphere, and winter in the southern hemisphere.

Belle of the Year

By GRACE STILLMAN MINCK

Up through the valley and over the hill
Summer will enter today.
I've already talked with a wise whip-poor-will,
Run by the side of a silver, cool rill,
Caught a small breeze that spun to her will,
And here's what I heard them say;
"Summer has banded her golden hair
With flecks of sunlight from everywhere.
She has woven the softest tints of flowers
Down through a ribbon of mellow hours,
And over her cloud-flounced garments tied
Garlands of color and light. In pride
She runs with laughter skimming the sky,
To juggle the stars unbelievably high.
Voluptuous Summer, the belle of the year,
Is only an hour and a hill from here."

Dogwood blooms make tempting photographic subjects. Usually, however, there is too much confusion in such a picture. Too much distracting detail of background is present.

The furry rosette-like leaves of the young mullein make an interesting pattern for photography, especially if the photographer will make the shot from above, as in this picture.

Camera Trails

By EDNA HOFFMAN EVANS

SPRING is in the air as I write this, although I realize that summer will almost here by the time the words appear in print. But, with tender new leaves sprouting on the persimmon tree, with fuzzy, yellow blossoms hanging from the tips of the willow twigs, with dogwood a-bloom in the woods, and with the new pup happily chasing crickets and an occasional butterfly in the yard, it is hard to ignore spring and think of summer subjects.

Yesterday I sat for a long time on the back steps, camera focused and ready, while a fat brown chameleon decided I was harmless and crawled out for a sun bath on the side of the garage. His bath was interrupted several times, but the incident only shows what Nature photography demands in the way of patience—from both cameraman and subject.

First, I disturbed him when I opened the door, spied him, and decided he offered photographic possibilities. Again, he was disturbed while I set up the camera and tripod. Then the pup romped by, pursuing a bumblebee. After that, just as I was ready to take the picture, the telephone rang and my start of surprise sent him scurrying back into hiding again. Finally, after five false starts, he settled down for a snooze in the sun, and I took his picture. Certainly that chameleon was an obliging model, Few Nature subjects would have waited so long. Possibly, like me, he had a case of spring fever.

Spring shows up in "Camera Trails" correspondence, too. A Colorado photographer is interested in a trip to the Dry Tortugas off the coast of Florida, and wants to know about transportation and picture possibilities. A student in Connecticut writes to ask about taking color pictures of wild flowers. She wants pictures to take back to Turkey to show her friends there. Other correspondents, too, are interested in the techniques of flower photography.

Flowers, fortunately, will be blooming in June and July, as well as now, so that a how-to-take-flower-pictures section will be timely as summer days roll in.

Actually, there is nothing mysterious about flower photography. It presents certain problems, to be sure, but so does every other kind of picture-taking.

On the surface, it looks easy. After all, a flower stays put. There is no danger a false move will frighten away a pretty blossom. Flowers cannot run, and they cannot fly. They do not bite when cornered, nor do they have any other unpleasant or odorous method of self-protection. All they do is bloom and look beautiful. The problem is to duplicate that beauty on film and paper.

Take dogwood, for example. The trees are covered with white blossoms and there is bound to be a picture. Focus your camera on a branch full of blossoms—it looks pretty spotty in the ground glass or rangefinder. All right, have an assistant pull several branches together—is that better? No, because now there is too much detail, and no main center of interest. But we will take a picture or two, just for the record.

Now let us try for a single blossom. Certainly, there is a center of interest here. Get it all in focus; stop the lens down as much as possible so as to capture detail. A lens stop of f/11 at 1/50th (with verichrome film) should do it. But look at the result. Certainly, it is not a salon print. But, remember this, salon prints are usually taken under controlled conditions. The light is constant and evenly distributed. There is no breeze to contend with. The background is something more definite than the vague, leaf-spotted distance you had to use. Remember, also, you are taking outdoor pictures and not operating in a studio. Nine times out of ten, your results will be disappointing. But keep on plugging for that tenth super-shot. You can get a salon print outdoors, but not with every shot.

Fuzzy, new, spring growth, like the symmetrical leaf arrangement of the young mullein, offers tempting possibilities. Take it from directly above, if you can, so as to show the rosette-like pattern. Stop down your lens to bring out texture, and be sure your shadow does not fall across the plant. With all this in mind, you are ready to take the picture.

The shy wild flowers that grow in the woods, especially where the ground is shaded completely, or is alternately flecked with patches of bright sunlight and deep shadow, offer problems that are hard to overcome. The photographer's best bet is to shade them completely. That way he will not have reflections or halation to contend with. On the other hand, due to lack of light, he will have to sacrifice detail or else take his picture very, very slowly.

The slower the picture, the more chance there is of movement, even in the case of more or less immobile flowers. Wind is the trouble-maker here, and rare, indeed, is the day when some vagrant breeze is not stirring.

In order to make an exposure of long duration, the photographer may have to take several shorter exposures, leaving his shutter open, but covering his lens while the flower nods and sways with the breeze. Then, when it is motionless again, he can uncover the lens and resume the exposure. Naturally, for pictures like this, the camera must be steady. Only by using a tripod or other substantial base can such pictures be made successfully.

This is the EdnaLite coated cine filter turret, newly released by the Chess-United Company, Inc., for movie cameras. The turret has two filters for use with color film, and two for use with black and white film.

Color photography, under such conditions, is well nigh impossible. With color, even more than with black-and-white film, correct exposure is of prime importance. Over or under-exposure does not give true color rendition, and the results are bound to be disappointing. Unless the photographer is unusually accurate in his estimation of light intensity, he should never try to take color pictures without first consulting a dependable exposure meter.

It is possible, of course, to pick the flowers, or to dig up the plants and move them to a more photographically favorable location. But, for me at least, a flower loses its interest as soon as it is picked. A plant, once moved, can rarely be replaced successfully. I would much rather enjoy a flower and allow it to live its allotted life span, than I would to pick it and get the best picture ever made.

Nature photographers ought to love Nature—love it and leave it, as the saying goes. The sense is different, however. A true Nature lover wants to preserve, rather than to destroy. And no flower I ever knew survived the plucking long. I boiled inwardly on Easter evening as, driving back to the city after a day in the woods, I saw numerous branches of withered dogwood blossoms discarded along the highway. Somebody picked them, killed them, and tossed them aside. We cannot keep on enjoying the beauties of Nature that way.

Fields of daisies, nodding buttercups, vistas of water hyacinths, or sunny acres of Texas bluebonnets literally beg for photography. Yet such pictures are apt to be disappointing. As in the dogwood tree, there is no main center of interest. After all, it is impossible to capture too much detail in a single picture. It is best to select one, or possibly two simple subjects, instead of trying for a whole field of them.

There are various ways of taking flower portraits. There are assorted gadgets that can be purchased, or, better still, contrived by the camera fans who use them. In the next section of "Camera Trails" I will describe, in detail, the methods used by one such ingenious flower photographer.

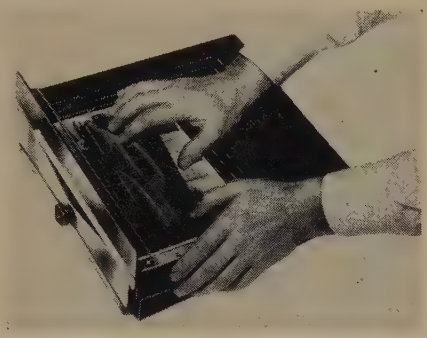
Meanwhile, for ambitious flower photographers, here are a few simple rules that may improve your pictures:

1. Select a center of interest; don't try to photograph all outdoors at once.

2. Take plenty of time for detail, but watch the breeze and make allowances for it.

3. If you must choose between bright sunlight and deep shadow, take the latter in order to avoid reflections and halation.

4. Make several pictures of the same subject, and do not be afraid to experiment. Just remember what you do each time, and that way you will not have to make the same mistake twice.



This "safe-t-trimmer", manufactured by the Calgary Brothers, has blades only an inch apart, and, thus, is less apt to chop off an unwary photographer's fingertips.

5. I do not like verichrome film—it is slow, and its color-sensitivity is incomplete. But that, of course, is purely a personal opinion.

FILTER GADGETS

Filters come in handy for many phases of Nature photography, and the mail this month brought in three releases concerning special filter outfits.

The Chess-United Company, Inc., announces two different filter kits. One type, that fits Beacons, Federal Fed-Flash and Ansco Rediflex cameras, contains a light green, light yellow, a +1 diopter portrait lens, and a sunshade holder, together with a three-compartment leather kit, retails for $4.95. For movie cameras the same company has the EdnaLite coated cine filter turret, whereby assorted filters can be moved quickly into place with a minimum of effort. The turret has two filters designed for use with color film, plus a medium yellow and a light red filter for black-and-whites.

Also, there is a new type of outside bayonet adapter ring for filters and lens shades, made especially to fit automatic Rolleiflex and Rolleicord cameras, by the Tiffen Manufacturing Corporation of New York City.

DARKROOM DOO-DADS

Here are items of possible interest to darkroom putterers. Three more of Kodak's chemical preparations—Kodak blue toner, Kodak chromium intensifier, and Kodak sepia toner—are now available in packet form for home use. Each packet contains enough chemicals to make one quart of solution.

Print trimmers look dangerous and, while I never heard of a photographer being guillotined by one, there is always the chance of losing a finger or two under a trimmer blade. Thus, folks who value their fingertips may find the new "safe-t-trimmer," manufactured by the Calgary Brothers, 2508 Broadway, New York, a good darkroom accessory. The new trimmer has blades only an inch apart and is operated by hand pressure on the calibrated platen. It sells for $10.95.

Gadgets

From the Coburn Manufacturing Company, Whitewater, Wisconsin, comes a versatile garden tool called "Garden Maker." It marks out rows the desired distance apart, digs a seed furrow to the proper depth, automatically covers the seed with dirt and then converts into a three-tine cultivator. Costs $5.95. . . . Even the scarecrow has gone modernistic. Donaxe Company, 305 N.W. 12th Ave., Portland 9, Oregon, puts out specially treated aluminum strips 15 inches long that flutter and tinkle in the breeze and keep birds and small mammals away from newly planted seeds, tender sprouts, berries, fruit and vegetables. . . . A. G. Busch and Co., 2632 N. Central Avenue, Chicago 39, Illinois, are putting out a Dura-Belt miniature white picket fence, which comes in sections and makes a nice protection for shrubbery and trees. . . . South Bend Bait Company, South Bend 23, Indiana, lures the fisherman with its trade catalog c-98. Besides all sorts of gear, there is an all-plastic, waterproof flashlight that is light to the hand and tough in service.

New Botanical Journal

From the Rancho Santa Ana Botanic Garden, Route 3, 23831 Esperanza Road, Anaheim, California, comes announcement of the publication of a new journal entitled *El Aliso*, which will be devoted to the botany and horticulture of plants of the Southwest, with special emphasis on California. The first issue deals with the botany, diseases and horticulture of North American species of *Cupressus*.

The School Page

By E. LAURENCE PALMER

Professor of Nature and Science Education, Cornell University, and Director of Nature Education, The American Nature Association

BEETLES IN SCHOOL

IF THERE were no beetles in school it might be about the only place in your community where they were not present. As suggested in the special insert in this issue of *Nature Magazine*, they may be found in water, in the earth, in wood, in plants and elsewhere. Because of this, few teachers, if any, can be excused from using real, living subject matter when it comes time to study beetles in school, unless they find it easier to read about them from a book while the beetles cluster about the window frames, eat the lunch left by the children, or consume the books that may be on the school's library shelf.

Because of the ubiquitous nature of the insects, one need not worry about having material with which to work, but one may find it necessary to choose wisely the method of study. We find abundant alternatives. We may consider beetles from their economic angle, particularly the destruction they cause to our valuable materials, living and dead. We may, as with the scarab beetle, consider them because of the important or unimportant part they may have played in man's history, here and elsewhere. We may use the esthetic approach, and consider beetles for their beauty. There are few creatures more attractive than a live, free, tiger beetle, or than some of the beetles we find on dogbane, of which one poet spoke as "the dogbane beetle's splendor." We may have the collector's instinct and seek to make collections, from which we can trade with other collectors, much as stamp fans barter. We may, and, I think, should, consider beetles as living organisms and learn as much as possible of their life habits. Their identification may be important, but their biology may form a more reasonable basis for evaluating their right to continue to exist in areas that may be of importance to our own prosperity. Naming a creature and knowing nothing about it is about as satisfying as reading a city's directory and never going out into streets to see what is going on in the community.

This is being written on the West Coast in the office of a former student of mine. On his desk before me is an enormous rhinoceros beetle. Having a sense of humor, my friend asks visitors if they have any such beetles at home in their backyards. Some, thus queried, seem to think that admission that such creatures have not previously entered their experience may be taken as evidence of lack of erudition. Consequently, they readily say that they have seen the animals in the back woods, a few miles from their home, or that they remember finding one once when they were on a fishing trip in the high Sierra. This beetle's presence in my friend's office provides an excellent sieve whereby he may select the bluffers and separate them from the honest observers. This particular species comes from South America, and only by the remotest of accidents could one be found free and wild in the woods and fields of California. This experience may suggest a unique use of bizarre beetles in your own schoolroom. It may work both ways, and some of your most attractive local beetles may be considered as wholly exotic by a superficial observer. Personally, I should prefer using an interesting local specimen to using the exotic example, since it might well induce investigation that might be worth while and enrich the appreciation of one's local environment.

Yesterday, I spent some time with an extensively trained science educator, who used the word science every time he could possibly get it in. He went out of his way to belittle poetry, art and music as being unworthy of the attention of so great and busy a man. He said that personification had no place whatever in the field of science education; teleology and anthropomorphism in any form whatever were to be abhorred at all times if you wished to maintain status as a scientist. He readily and willingly classed himself with another person who once told me that, since he was a scientist, or since he had become a scientist, he had lost all interest in the theater, the opera, the art gallery and the church. I could not help but continue to feel sorry for the degree to which both had lost opportunity to get enjoyment from some of the finer sources that enrich one's human experience. I wondered, too, if, now that he had become a great scientist in his own estimation, he could not enjoy reading A. A. Milne's "Alexander Beetle." If he has reached such a degree of isolation I confess I had to be genuinely sorry for him, because, in trying to become one thing, which he had not become, he had lost the opportunity to enjoy the commonplace, to get fun from little things. I thought of the poetry and fine prose that had come from the pens of David Starr Jordan in the West, and of Liberty Hyde Bailey in the East, neither of whom was ashamed to work with little children or to try to speak their language. Bailey, at ninety, is searching the jungles of Jamaica for palms that he feels must be added to his collection. The last time I saw Jordan, shortly before he died, the author of *The Manual of Vertebrates* held in his hands a tree toad I had just handed him, and, with no apology whatever, remarked that he wished he knew to what species it belonged.

Human qualities do not obscure greatness. They magnify it, so if you feel that you would like to study beetles in your classroom do not worry if you cannot name every beetle the children bring to you. The chances are rather good that some of the science educators might not even recognize all of the animals as beetles. Certainly this will be true if your material represents not only the mature stages of your beetles but the immature stages as well.

Many beetles can be reared in the simplest of terraria, which you can make from fruit jars covered with metal screen. In these you can provide food and climatic conditions similar to those existing where the animals were collected. In such terraria, in an ordinary schoolroom, you can see the predacious larvae of ladybird beetles feed on plant lice. In spite of what the standard science tests say, you may also see some ladybird beetles feeding on plant materials instead of on insects. You may elect to believe what some educational tests insist you should believe, or what you see with your own eyes. I think

Last Rites

By COSETTE MIDDLETON

When I was nine and brother half-past-seven
We found a crippled fledging in the field;
Doubting the prospect of a blackbird heaven,
We went to work. With visions of a healed
And grateful songster on our window-sills,
We patted camphor on its injured side
And gave him tea with crumbled sleeping pills,
We swaddled him in flannel—but he died.

He had a decent burial, with phlox
And candytuft. Then, after psalms were sung,
We laid him in the emptied metal box
Marked "Tools" upon the cultivator tongue.
I do not know what Father said when he
Reached for the pliers, come spring, out in the upper
North forty field. I only know that we,
Brother and I, stood up and ate our supper.

that it would be a good thing if every child could have followed the life history of at least one beetle through from beginning to end by observing what happens in a school room terrarium made from an old fruit jar. It might be even better if you saw to it that children observed the story of two beetles, one that was a plant eater and one that fed on animals. Then there would be no danger of having the youngster form one of those dangerous generalizations so thoroughly worshipped by a superficial scientist who may write your textbook or prepare your course of study for work at the precollege level.

Yesterday, I talked with an elementary teacher who was all fed up with this science business. She had tried to do her best. She had spent five of her hard-earned dollars to buy a stocked ant-observation nest. When the nest came to her, the ants were all dead and so far as she was concerned the whole thing was no good. She had written and tried to get the supply house to send her some more ants to put in her nest, but they had refused either to send her new stock or to refund her money. How much better it would have been if she had learned how to make an insect-observing terrarium from an old fruit jar, or, better yet, to learn to understand the insects that came into her schoolroom uninvited and offered themselves as subjects to her study. I admit, of course, that the insects do not go up to the teacher and say "Dear Miss Jones, won't you use me as an object lesson in your class," but in spite of that, and of critics of teleology and anthropomorphism, I still reserve the right to some freedom of license in the field of writing. You, of course, are entitled to disagree with me. There is one point, however, on which I am sure there will be no disagreement. If you will just give the study of the beetles that live in your own neighborhood a fair trial, I feel sure that you will want to know more about them. Whether you like it or not, you are going to live the rest of your life with them, and, under normal natural conditions, they might well have something to do with your body after you die. They are worth knowing, and I take pleasure in introducing some of you to them with the hope that you will want to introduce them to your children in your schoolroom.

Tree Planting

"Tree Planting in the Central, Piedmont, and Southern Appalachian Regions" is the title of Farmers' Bulletin No. 1994 of the United States Department of Agriculture. It is the joint work of Leon S. Minckler and Arthur C. Chapman, and the title is descriptive. Copies are available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., for fifteen cents.

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COME TO THE
Audubon Nature Camp of Texas

ON the banks of the Guadalupe River, 65 miles northwest of San Antonio, the Audubon Nature Camp of Texas will present its first summer program with five two-week sessions in 1948.

The camp will be located at Kerrville, favored summer resort of Texas—a land of green valleys, winding canyons, cypress-shadowed rivers.

It is designed to aid superintendents, principals, and teachers; colleges and schools, Scout and other youth organization leaders; librarians, club conservation and bird chairmen to present nature and conservation subjects more effectively. The camp is sponsored by Texas Garden Clubs, Inc., and endorsed by the State Education Department, State Game, Fish and Oyster Commission, and a dozen leading educators and museum directors.

The camp will be at the Schreiner Institute, easily accessible by car and bus from all parts of Texas. Altitude 1650 ft. Average summer temperature 79.8°—with cool nights and low humidity.

Five two-week Sessions in the summer of 1948:

June 19—July 2 July 3—July 16 July 17—July 30
July 31—August 13 August 14—August 27

Write for illustrated folder to Mrs. Alfred A. Krueger, 5122 Tremont Street, Dallas, Texas.

Administered by the National Audubon Society.

CAMPS TO CLASSROOMS

By Ruth A. Dodge

Biologists and naturalists! Combine your separate ways!
Provide youth with a habitat—a camp for special days.

Out of the classroom and into a camp! The spirit of youth mounts high as the first faint whispers of spring fade into summer sounds and the call of the wild lures Nature lovers into the wide open spaces. Their paths are as varied as the patterns of a leaf mosaic. Many will need to confine their ventures to weekends and evenings; a few will become Nature counselors. Some will go to family cottages with Nature transplanted at their doors; others will be in organized camps with planned programs. Whatever their lot and wherever they go there is need for knowledge of the common things of earth—the geologic history, the climate, the types of soil, determining the flora and the fauna; the effects of civilization and the balance established by man.

But unless definite steps are taken to make such knowledge available, to stimulate interest in acquiring it, and to encourage its use, little will be gained. To biologists and naturalists alike this presents a challenge.

When camping skills have reduced the essentials of healthful living to a minimum, and experiences in democratic relationships have brought about social adjustments, there is an unusual opportunity to place in the hands of the students the subject tools and techniques for the future by the development of a balanced program through group planning.

Biologic principles form the basis of such a program toward which all activities are directed. Interdependence and interrelationships require careful study of many different habitats, the collection of large numbers of specimens show the need for classification into related groups, and the establishment of a trailside museum necessitates knowledge of the care of living things and the preservation of material for collections or classroom use.

Selection of activities to be undertaken depends upon the group. The age and school grade, club membership, camp training and interest indicate the type of program and point to the limitations or extent to which it can be carried out. High school students are able to undertake both group and individual projects that have a direct bearing on their classroom studies.

One of the subjects more frequently chosen is that of classification. It is usual to begin with identification of familiar forms from pictures, descriptions and keys, followed by the collection of samples for the school or camp museum. After general interest has developed, plant and animal groups are selected for detailed study, the amount of classification possible being dependent upon the ability of the class.

If insects happen to be the subject of choice, the students should know: (1) the characteristics of an insect, (2) how it is related to crayfish, spiders and myriapods, (3) why it was classified under Arthropoda, (4) how to distinguish orders of insects, (5) how to collect and preserve insects typical of each order, (6) how to distinguish families of at least one order selected for special study, and (7) the reasons for binomial nomenclature. In order to gain this information the students will need assistance in assembling such equipment as butterfly nets, dip nets, insect traps, collecting bottles, poison jars, labels, pins, pinning boards, mounting cases, lenses, pictures, keys, guides and reference books. Suggestions for supervision of field trips include: (1) indications of locality, (2) the best time of day, (3) instruction in the use of equipment, (4) guidance on the trip and (5) direction of the disposition of material collected.

From these activities it should be possible to point out (1) interdependence with plants for food, (2) dependence on climate for existence in present habitat, (3) the existing factors in the theory of natural selection; overproduction, as evidenced by large numbers of offspring; struggle for existence, shown by the multitude of natural enemies; survival of the fittest; the characteristics such as color, which give added protection; variation, shown in patterns on beetles or butterflies and heredity, the factors of which determine the continuance of the species.

These intensive studies, coupled with the fun of camp, lead into projects which can be carried on in the classroom upon return to school in the fall. Life histories can be followed, structures examined under lenses, specimens preserved and mounted for comparative studies later, anatomical similarities noted and physiologic processes observed.

A hobby hour lends variety to the program. Camera trails for stalking game, fossil hunts into the historic past, walks to haunts of birds and ferns, wading streams, upturning stones, building blinds for observation at water, bee trees and beaver dams, all provide opportunities for the development of special interests. At camp there are crafts of wood, or shells, or cones, artistry with Nature motifs, plaster casts or molds of tracks, dyes from plants, food from shrubs and medicines from herbs.

Living at camp thus affords a wealth of information to add to the fund of knowledge that has been increasing throughout the school years and creates a lasting interest in a Nature hobby. It also sets the stage for the deepest inspiration and the highest aspiration, as campers and counselors alike search for birds at sunrise, pause on a mountain top at noon or stand in awe of the setting sun.

These are the lasting impressions, the values that go back from camp. For as eagerly as youth dashes from classrooms and into camps, so readily does he return from camp to classroom, proudly bringing his collections as a victor with his spoils, and inspired to venture farther into the realm of living things.

The trend toward camping education, brought out in the article by Dorothy Miller in the November, 1947, issue of this magazine, is rapidly becoming a reality. Schools and boards of education are deeply concerned with campsites and living facilities, with little thought and time given to camping programs. Biology teachers should play a real part in introducing Nature study, developing a better understanding of biologic principles, and creating an interest in all living things, which will closely correlate the classroom and the camp.

As President-elect of the National Association of Biology Teachers, a lover of Nature with deep interest in outdoor living, and an earnest desire to bring together the program suggestions of all Nature groups in preparation for the December meetings of the societies, I urge you to send in your suggestions and requests, and plan to attend the three-day convention to be held in Washington, D. C. The theme and the outline of the program will appear in a later issue of *Nature Magazine* and *The Biology Teacher*.

In the Surf

Surf Fishing. By Vlad Evanoff. New York. 1948. A. S. Barnes and Company. 83 pages. Illustrated. $1.50.

This is a new addition to the Barnes Sports Library and is a practical guide to this specialized fishing activity, covering everything from the equipment needed to lore of the surf angler.

THE READER'S MARKET

A place where members of the American Nature Association and readers of Nature Magazine may find many interesting offerings or may advertise themselves, at low cost, for things wanted; things they have for Sale, for Trade, for Sale or Trade. This is an excellent forum for acquiring or disposing of such items as binoculars, books, cameras and photographic equipment, magazines, sports and outdoor equipment, etc.

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11. The association will not accept for publication in NATURE MAGAZINE, advertisements of firearms, ammunition, or patent medicines.

12. *Responsibility for illegible copy:* Type or print advertisement plainly as we cannot be responsible for errors due to illegible writing.

13. *Closing date:* The closing date of all advertisements is the 20th of the second month preceding month of issue.

BIRDS

CANARIES AT WORK and Play; New book; training, care, fun. $2.50; Also Swallows of Capistrano, 50¢. Wetzel Publishing Co., Los Angeles, 13, California.

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BOOKFINDERS! (scarce, out-of-print, unusual books) Quickly supplied. Send wants. Clifton, Box 1377nm, Beverly Hills, Calif.

"FACTS ABOUT BIBLE AND APOCRYPHA," 50¢. People's Christian Bulletin, Box 87-N, Cathedral Station, New York 25, N. Y.

"THE CASE FOR Creation and the Deluge," 85¢. Christian Evidence League, Malverne, N. Y.

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WANTED: Copy of "From Friend to Friend," by Volland. State price wanted and condition. Mrs. H. L. Heizer, Dalton, Nebraska.

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RAISE Fryers new easy way. One-Man Home Plant earns $500 monthly. Booklet Free. Poultry Guild, 1046-K So. Olive, Los Angeles 15, Calif.

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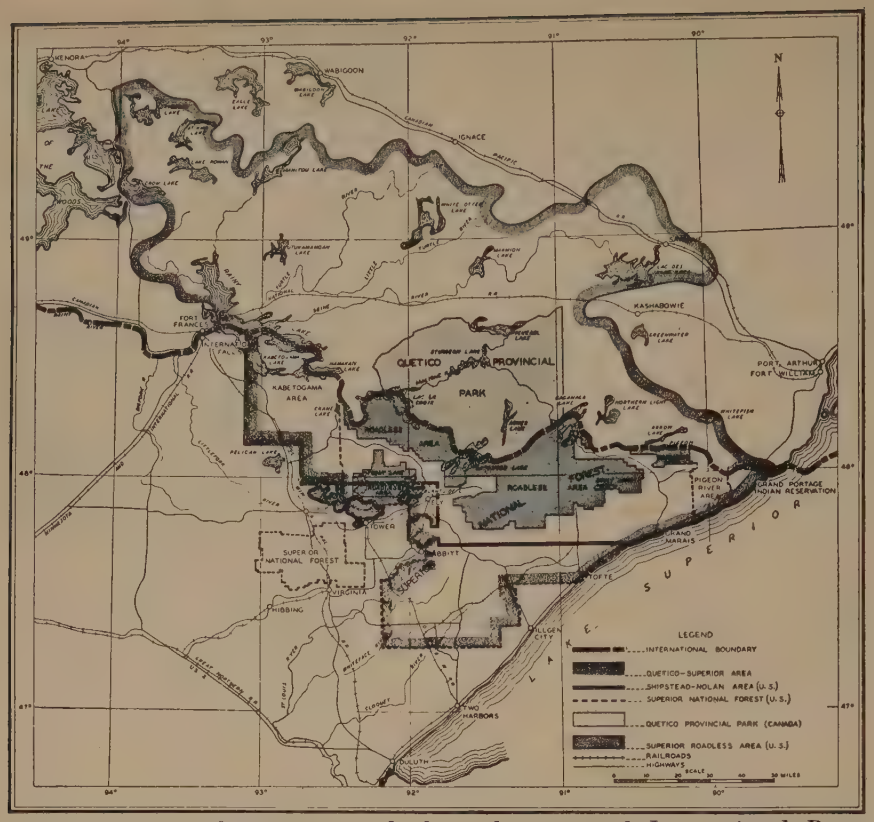

This map shows the region involved in the proposed International Peace Memorial Forest that will preserve for all time this glorious wilderness area of the early voyageurs.

(Continued from page 293)

of Crooked Lake, was responsible. Built on a small holding of private property, it was completely encircled and protected by federal land of the Superior Roadless Area. To this resort, Bart Lake was just a private bass pond, widely advertised in the literature, another place to exploit.

I stood there as I had done at Paradise Harbor over at Knife, trying to remember the first day I had come in, the morning when I had seen it as voyageur might see it, virgin, untouched and beautiful.

We portaged the canoe, paddled once more clear to the north end, past the old campsite with its white ledge of glaciated rock. On the way I whipped a fly at all the places where, in the past, the big ones lay, the beaver houses, the broken talus at the base of the cliffs, the reed beds and bunches of lily pads off the windfalls, but the bass were gone and I did not get a rise. I knew the answer—minnows, and plugs, and baits of all kinds, and the shipping out of great catches by plane. Canoemen never took more than they could eat. At last I put my rod away and just paddled down the shore.

The lake was as lovely as ever. Our campsite had been enlarged but the pines still stood. As we rested by the fireplace, the old vision returned, a vision of a day in the future when Bart would again belong to the voyageurs, a day when the portage would be grown once more to trees and ferns, and the rocks covered with lichens; a day when the dock would be gone, the oil drums and the boats; a time when the lake would know only the soft swish of a paddle at dusk, and the sound of noisy motors would be forgotten. I knew that could happen if the United States and Canada would only become conscious of what was at stake. It must come again, so that others could know the joys that had been mine.

The third place I felt I must see was one of the most famous beauty spots of the Quetico-Superior—Curtain Falls, the outlet of Crooked Lake. Just before the war, I made a canoe trip with my family down along the eastern border into Lac La Croix. As we approached the falls, we could hear the roar. It was very still that day and the sound of falling water dominated all other sounds of the wilderness.

"Even the voyageurs couldn't miss that portage," said one of the boys.

All the way down the border and the twenty-mile expanse of Crooked Lake, I had regaled them with stories of the men from Athabaska, Lake of the Woods, and Rainy, who used to come down that chain of border lakes on their way to Grand Portage Post on Lake Superior. We sang the old French songs they used to sing, camped where they camped, and packed along the same old trails. I tried my best to make the boys feel that the wilderness way of life was a good life and a happy one because a man was doing what was natural and free. I wanted them, as modern voyageurs, to be a part of that ancient tradition.

When we landed at the smooth black rock just above the falls, I knew what they were thinking. They saw the voyageurs' canoes at the landing, heard the chatter and excitement as the ninety-pound packets were loaded on for the half-mile carry around the rapids. And as they carried their own loads down that misty trail with the sound of plunging water in their ears, I knew the story of the past had really become part of them, that in their hearts they now were red-capped wilderness men of the old Hudson's Bay. To me it was reliving the first time I had seen Curtain Falls. I saw through their eyes and caught again the almost forgotten vividness of my first impressions.

Last fall, I came once more to Curtain Falls. The war was over and many things had happened. I had been on a swift cruise clear around Hunter's Island, that region surrounded by the split river that begins at Saganaga on the east and joins again at Lac La Croix. I had traveled some 200 miles and had become impressed with the tremendous area that was still unspoiled. I had heard about the resort that had come in at the site of Curtain Falls, but somehow it had not seemed real. Like the one on Friday Bay, I knew it also occupied a lone bit of private land surrounded by thousands of acres of federal preserve, a tiny island of exploitation in the heart of the Superior Roadless Area.

When we landed at the foot of the portage, I was conscious of the same old roar as of old, the mist-laden air, the feeling of tremendous and surging power. But a flat-bottomed boat pulled up at the landing, and some gas cans and minnow buckets, the same introduction I had had at Bart. At the upper end, where we dropped our packs and the canoe, were several more boats with shiny motors and a party of fishermen taking pictures. They were dressed for dinner at the resort just around the corner. They looked at our worn and travel-stained cruising outfits as though we were out of place, trespassers on what to them was a private bit of scenery.

"Grand spot," said one of them. "Can you imagine all this power going to waste way out here.'

I could see the new, varnished buildings, a party of swimmers lolling in the sun. A plane was tied to one of the docks. It was red and silver; made a pretty splotch of color against the blue of the water.

"Flying is great stuff," said my friend. "Just think, we made it in here in just 27 minutes. It will take you a good three days to get out."

We did not linger to discuss the matter, or to comment, just loaded up and pushed down the lake. I wanted to remember Curtain Falls as it was the day I saw it on my first trip in, and then again with my boys. I wanted desperately to keep the old wilderness tradition intact and forget that now it was just a scenic showplace littered with film packs.

As we paddled down the lake, with the sound of the falls behind us, the vision that had come to me at Paradise Harbor and at the little bass lake called Bart was clearer than ever before. I knew that

the only hope for the restoration of such spots in the Quetico-Superior country would be through the creation of The International Peace Memorial Forest and an agreement with Canada as to a broad and comprehensive plan of land management and zoning that would recognize the real values of the wilderness canoe country. Under such a plan the resorts could be zoned outside of the wilderness itself—the towns, the railroads, the flying fields, beyond them. There would be room for all types of development, but, unless there was a plan, there was no hope.

My cruise had convinced me of the worthwhileness of the Quetico-Superior project. Although the famous Voyageur's Highway along the international border had been desecrated, it could come back. The old charm and appeal were still there, and great areas had not been changed at all. Such an international program substituting for the old system of exploitation, a long-range plan of conservation that would not only preserve wilderness values but perpetuate all other land and water resources, was the only hope.

I knew the day must come when I could stand again on the spots I had known in my youth and see the old wilderness as I had seen it then. All young people must have that same opportunity. It was part of their heritage, part of their dream of America.

Sessions at Fernglen

Three two-week sessions of the Fernglen Workshops of Biology and Nature Study will be held at Antrim, New Hampshire, this year, starting July 1 and concluding August 14. Complete information may be obtained from Mabel E. Turner, P. O. Box 230, Antrim, New Hampshire.

Trumpeter in Alaska

Reports from Alaska to the U. S. Fish and Wildlife Service record growing numbers of the rare trumpeter swan in southeastern Alaska. Some 300 birds winter there, and young birds have been observed in the summer. It is thought that these trumpeters may be an overflow from the Canadian flocks known to winter in British Columbia. Once an abundant bird, it was reduced to a pitiful remnant in the United States and now numbers about 350 birds in this country.

Fire

Fire. By George R. Stewart. New York. 1948. Random House. 336 pages. $3.00.

This is a new novel by the author of *Storm.* It is the dramatic story of eleven days of battle against fire that threatens to destroy a great western forest. It is a drama of man fighting against a fierce enemy, pitting strength and fire-fighting cunning against one of the most frightening of Nature's phenomena on the loose.

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LOOK FOR THE LEAF ON THE PACKAGE

LIBERTY HYDE BAILEY

(Continued from page 316)

has been known to clamber like a squirrel through the treetops for a considerable distance when the ground was impassable. But he always gets his plant! He is still planning a trip to Africa, a continent he has never explored. This project had to be abandoned because of World War II. His "easy" expeditions he is saving for his "old age."

On one trip to South America, he met a nurse, a Chinese girl, who was so impressed with his vigor that she asked if she might examine his heart. "You know, Dr. Bailey, I have never examined the heart of a man your age," she said.

He laughingly complied and threw open his shirt so that she could listen to his heart. This she did thoroughly and with wide-open eyes.

"Why, Dr. Bailey," she exclaimed, "it is remarkable! You have the heart of a young man!"

And that is the story I like to tell the boy and girl gardeners when presenting the Liberty Hyde Bailey medal of the National Garden Institute for prowess in junior gardening. For, although we cannot all live to be ninety, one of the best ways to insure a ripe old age is to develop an interest in gardening and Nature. Wholesome, interesting work in the outdoors will help prolong the life of anyone, and it will provide a hobby that will help to develop peace of soul at the same time.

A story that Dr. Bailey tells in one of his books is of the old gardener who only had a little plot, but loved it and made it bloom. "This is just a little plot on the surface," the old gardener said, "but I like to think of how deep it is—it goes all the way through the earth!"

Matches Fight Fire

Vacationists and others entering wooded areas will be handed books of paper matches carrying warnings against carelessness with fire as a contribution of the Diamond Match Company to the educational campaign for forest fire prevention. The company is contributing 750,000 books of the matches, which will make the warning visible at the very moment the user strikes a match. Stickers are also being provided to be affixed to pocket-size boxes of matches.

Conservation Aids

Two recent publications by the United States Forest Service, Department of Agriculture, Washington, D. C., will be helpful to teachers in connection with conservation education. One is entitled "Materials to Help Teach Forest Conservation." It lists source material available from the Service. The other is entitled "Some Conservation and Resource-Use Workshops and Courses."

Robert Bruce Horsfall

Word came just as the May issue of *Nature Magazine* was going to press that R. Bruce Horsfall had passed away. We were forced, under the circumstances, to content ourselves with a brief note to that effect, and to postpone a tribute to a great artist until a later date.

An artist is fortunate in his memorials, in that he leaves behind graphic evidence of his talent. Bruce Horsfall left such in quantity, in the form of illustrations for many books, reproduced paintings, and splendid backgrounds that gave added life to notable museum habitat groups. It is not our purpose here to recite the long list of Bruce Horsfall's contributions. They speak for themselves. Rather, we would like to give a brief picture of Bruce himself.

He was a little man with a big heart and a great talent. Although trained generally in the artist's calling, both here and abroad, he had a fundamental love and knowledge of Nature that turned him to that field at the expense, perhaps, of the greater acclaim and larger financial reward that he might have found elsewhere. We have seen from his brushes examples of portraiture that suggest that he could have walked with the masters had he wished to follow that bent. We have seen landscapes that could place him among the greatest of landscape painters. Yet he chose to represent Nature as he knew her, and as he felt her influence.

Having achieved a considerable fame before World War I as Nature artist, illustrator—principally of Nature books and stories—and painter of museum backgrounds, Bruce Horsfall went to Oregon on what was to have been a large assignment in the museum field. War came and the project vanished into thin air, as did much of the demand for his work. Instead of becoming, as he could have done, a camouflage expert for the government, Bruce went to work in a shipyard catching rivets, of all jobs. Peace found him still in the West, far from his markets. In 1924, however, he came to Washington to serve as artist for *Nature Magazine*, doing color covers and inserts, illustrating articles and working on pictures of the birds and mammals of North America besides contributing an occasional article. The pictures he did in this series were reproduced in the first volume of *Bird and Animal Paintings*, after first appearing in the pages of the magazine. The originals are beautiful little pastels, painted in water color and the same small size as the reproductions. We never ceased to marvel at the beauty of these complete little pictures, each bird or mammal in its proper setting. Bruce Horsfall had, in our opinion, an unsurpassed ability to make a *picture* from a painting of a Nature subject. He worked rapidly once he had a mind-picture of what he wished to paint. To see a painting ooze from his pen or brush was to marvel.

There were many commercial channels that Bruce Horsfall could have explored as an artist. These did not interest him. The idea of doing occasional covers for the big and well-heeled magazines failed to lure him, as did the suggestion of a well-drawn, accurate, Nature "comic" strip.

During the period of illness that preceded the somewhat tragic death of Mrs. Horsfall, his care of her was tender, understanding and self-sacrificing. When she passed away he decided to retire, "to paint only what I want to paint."

Death came after Bruce was taken ill on a visit to his brother in New Jersey. But in his four-score years he gave much to the world. The beauty of Nature he depicted, the knowledge of Nature that his work inspired in innumerable people, are legacies such as few of us can hope to leave behind. R.W.W.

More Nature Camps

Although somewhat belatedly, press times being what they are, word comes to us of the opening of two new Audubon Nature Camps this year, one in Texas and the other in California. The Texas camp is sponsored by the Texas Garden Clubs, and will hold five two-week summer sessions at the camp on the Guadalupe River near Kerrville, Texas. Full information and application for enrollment may be obtained from Mrs. Alfred A. Krueger, 5122 Tremont St., Dallas 14, Texas. The California camp is the high Sierra country of California, and will also have five two-week sessons. Write to Mrs. Ethel E. Richardson, 887 Indian Rock Avenue, Berkeley 7, California, for information.

More and More Pressure

Hunting and fishing on the 152 national forests has increased so much since the war that, for the first time in many years, the rate at which gunners are taking game from the forests is rising faster than the rate of increase of game animals, reports Lloyd W. Swift, Chief of the Division of Wildlife Management Forest Service.

NATIVE HABITAT ANSWERS

1—b; 2—c; 3—a; 4—c; 5—b; 6—a; 7—c; 8—a; 9—b; 10—g.

More Information

Information Roundup. By George Stimpson. New York. 1948. Harper and Brothers. 587 pages. $3.95.

The subtitle of this book is "A New Treasury of Odd and Fascinating Knowledge," and this is amply descriptive of its contents. It is the latest of a considerable series of information books by the author, Washington newspaperman with one of the most probing and exploratory of minds. His present publishers admit only two previous books, since this is the third work by Mr. Stimpson that they have published—*A Book about a Thousand Things* and *A Book about the Bible.* A quarter-century or so ago George Stimpson started gathering odd and interesting facts. His files grew and grew, bulging over into books, all of which make the most fascinating random reading, for the author tells, always interestingly, of such interesting things as how the expression "mad as a March hare" originated; how the Teddy bear came into being; whether edible mammoth meat has ever been found; whether moths eat clothes. An excellent index makes a reference book of this volume.

Bronson's Pinto

Pinto's Journey. By Wilfrid Bronson. New York. 1948. Julian Messner. 57 pages. Illustrated in color and black and white by the author. $2.50.

We have never been able to decide whether we like Wilfrid Bronson's writing more than his illustrating, or vice versa. Perhaps it is a draw, because the two seem to go together to achieve a delightful whole, as is the case in this latest book for younger readers. Pinto Goodluck was a little Indian boy who made his perilous way to a secret turquoise mine of which his grandfather knew. The trip was no Sunday afternoon stroll, and we would not take the edge off the joy of taking the trip with Pinto by revealing what took place.

Starlings

Starlings. By Wilfrid S. Bronson. New York. 1948. Harcourt, Brace and Company. Illustrated by the author. $2.00.

Most hands are raised against the imported starlings, and rarely does one hear a good word said for the bird. We, in *Nature Magazine*, have probably been one of its few friends, at the same time recognizing that the bird is not always an asset. Now Wilfrid Bronson joins the starling friends, at the same time admitting that the bird has its faults as a member of the avian ensemble. The author's always interesting and entertaining illustrations combine with a simple text to produce a book that is calculated to arouse friendship for the starling among the younger generation, to which the book is addressed.

Sierra Club Bulletin

Although it is published monthly, except for August, once a year the *Sierra Club Bulletin* takes on book size. That issue, in particular, is always a delight to receive and read, and the March, 1948, issue is no exception. Among the excellent articles in that number is a significant contribution to conservation history in the feature entitled "Yosemite: The Story of an Idea," by Hans Huth, and William E. Colby follows this with an article entitled "Yosemite's Fatal Beauty." Each article, in fact, merits careful reading, and the three groups of pictures are superb.

The Face of the Earth

The Earth's Face and Human Destiny. By Ehrenfried Pfeiffer. Emmaus, Pa. 1948. Rodale Press. 182 pages. Illustrated. $2.75.

Dr. Pfeiffer has long been a student of what he calls biodynamic agriculture. He has surveyed with concern the march of man across the face of the landscape and the wake of depleted soil, and, therefore, depleted human existence, that he has left behind him. In this book he seeks to lead man in a course that will apply certain biological principles to the regeneration of that which supplies him with his very life—the soil.

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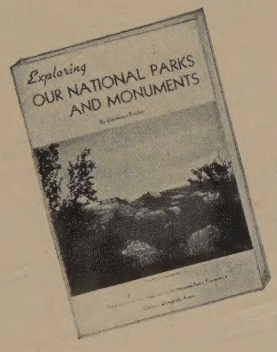

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American Nature Association, Washington 6, D. C.

Pupa of *Culex pipiens.*

Anopheles quadrimaculatus, pupa.

Under the Microscope

By JULIAN D. CORRINGTON

PHOTOMICROGRAPHS FROM SLIDES COURTESY WARD'S NATURAL SCIENCE ESTABLISHMENT, INC.

MOSQUITOES

IV. Pupae

THE larvae and pupae of mosquitoes are to be sought for in a great variety of situations. Where the female deposits the eggs, there the earlier stages must be adapted to dwell, if they are to complete the life cycle. Some species will not tolerate brackish water, others will stand a considerable proportion of salinity, even to breeding in the ocean itself. Some prefer streams with slow currents, others will be found only in completely stagnant pools; some occur in sunny watercourses, others solely in the shade. Snow mosquitoes lay their eggs in the temporary melt-water of snow fields; tree-hole mosquitoes perform their maternal duties only in water contained in pockets high up in trees, notably those made by epiphytic plants.

The larval period may last from a few days to all winter, depending on the habits of the species, as discussed previously in this series. When the fourth instar of the larval period has completed its development, with rudiments of the wings and legs beginning to show through the skin, and the compound eyes shaping up, the insect enters upon that mysterious sequence of destructive and constructive events comprising the pupal stage. The word comes from the Latin for doll, as in puppet.

Insect pupae are classed as either *free* or *complex.* In bees and most beetles, as examples of the first type, the appendages are not soldered to the body, but are "free," although pressed against the body. These pupae are also referred to as *incomplete.* In most flies and lepidoptera, the wings, legs, and antennae are not free; the pupa appears as a headless, oblong object, without organs or distinctness of construction until viewed more closely, whereupon, in the *obtected* type, as exemplified by the butterfly chrysalis, the appendages are seen through the skin. The *coarctate* type or *puparium,* as in many flies, uses the last larval skin as a case for the pupal instar, which is accordingly invisible as such, lying concealed within the hardened case. In addition, cocoons of many forms and materials are used by numerous pupae.

Regardless of type, what goes on within the outer integument or case of a pupa is of greatest interest. Here, alone among animals, do we have a phase in the life cycle when bodily structures, so marvelously developed in the embryo and perfected in the four larval instars, are actually torn down and destroyed, to be replaced by very different organs.

The situation may be visualized if we compare it with the remodeling of a country home. Let us imagine a frame farm house of two stories, plain, square, unattractive, with no porches or attic windows, and no modern conveniences. New and wealthy owners employ an architect to plan elaborate alterations. A scaffolding is erected around the house, concealing the work that goes on within. When at last the scaffolding is torn down and removed, revealing the new dwelling, one sees a stone and clapboard building, with an ell and an offset, story-and-half, dormer windows, spacious side veranda, and many other external changes, not to forget a fresh coat of paint and new roof. Within are new partitions and many new fixtures, furnishings, and all modern utilities—central heating, electricity, gas, plumbing. Mrs. Perkins avers that she would never have known the place.

Mrs. Perkins would likewise be unable to see any connection between a caterpillar and a butterfly had she not learned the story as a child. For of comparable radicalism are the changes that transform an elongate, worm-like insect, with short and stubby legs, wingless, with very small, simple antennae, mandibulate mouthparts, and undeveloped gonads, into an utterly different-looking kind of animal. The larval crawler, tied to the earth, becomes a winged sprite. The primitive mouthparts are now elaborately modified to form a long sucking proboscis, coiled when not in use; the antennae and legs are long and slender; the body and wings are clothed in hairs of great beauty of form and color—in fact, everything seems altered.

Studies of the pupal stage show that many of the complex organs of the larva are torn down and destroyed, the chief action being termed *histolysis,* or dissolving of tissues. With the law of conservation of matter in mind and knowledge that the pupa takes no food, one could guess that the materials resulting from destruction of larval organs go to serve as building blocks for the new organs of the imago (adult). In the hypodermis, or layer of living cells of the integument, for example, *imaginal disks* occur in the pupa. These are masses of hypodermal cells from which such structures as the adult wings and legs are formed.

Mosquito pupae are of the perfect, complete, or complex type, as various authors have termed it. Within this classification, however, they are unusual in that they are *motile.* Most other pupae, of whatever type, are quiescent—generally so much so that the creature shows no signs of life at all. In some, as the butterfly chrysalis, the fifth or sixth abdominal segment, or both, may retain mobility; in some, a certain amount of activity is achieved at the very end of the pupal instar; but on the whole we think of pupae as absolutely torpid, hence the unusual estate of the mosquito pupa, or tumbler, a freedom shared

Pupa of *Aëdes ægypti.*

with a few other flies that have aquatic larvae.

Among outstanding characteristics of mosquito tumblers is the fusion of head and thorax into a *cephalothorax*. Projecting dorsally from the thorax part is a pair of *respiratory trumpets* or *horns*, which puncture the surface film of the water to obtain air. This is similar in method but entirely different in structure from the anal spiracles of the larva. The adult will, of course, obtain its oxygen by means of still other spiracles, again quite different in structural plan.

The abdomen of the pupa is shrimp-like, and, as the cephalothorax is relatively so large as to be thought of as a body, would be considered to be a tail by those not versed in arthropod architecture. As in the larva, it is nine-segmented. The abdomen ends, again shrimp-like, in a large pair of *anal paddles*, also called swim paddles or fins, by means of which the creature tumbles to the bottom when disturbed. Although hairs are not as numerous as on the larva, nevertheless there are certain ones of importance; some of those situated anteriorly and dorsally assist in suspension of the body at the surface film. The compound eyes are large and often dark-pigmented, and such other organs as antennae, wings, and legs can be seen growing beneath the semi-transparent skin. Some of these pupae, particularly the culicine, bear an odd resemblance to a caricature of a horse's head, the respiratory trumpets appearing as ears.

Not as much can be done by way of positive identification of pupal mosquitoes as we have seen was the case with adults, larvae, and even eggs. If a number of pupae are collected, they are generally kept in water within a cage in the laboratory for the two or three days necessary for emergence of the adults, which are more readily identified.

In general, the anopheline pupa has a larger cephalothorax than does the culicine, and rides when undisturbed in a bit more of a horizontal position. As pupae are compressed, they are mounted on slides in side view, whereas the depressed larvae present a dorsal view when mounted. No special instructions are needed in regard to whole-mounting of pupae.

In concluding the present series of four articles on the life cycles of mosquitoes, we should like to suggest to microreaders who have found the subject to their liking that they collect some mosquitoes and try to breed them under laboratory conditions, or collect eggs and hatch them. In this way, all stages in the life cycle of a single species may be obtained and mounted on a series of eight slides that will have considerable value from the standpoint of completeness: eggs, larva of each of the four instars, pupa, adult male, and adult female.

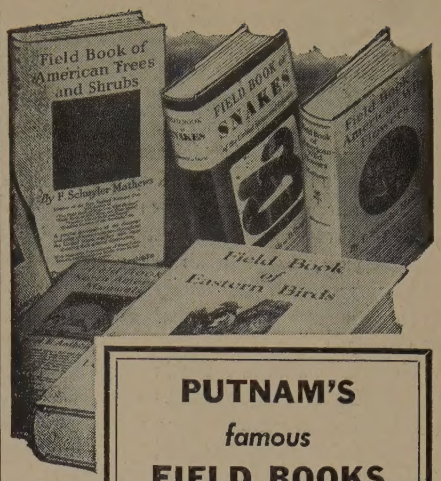
Unless you are an expert, you will need to have the species identified for you by some technician connected with a public health office. Duplicate adult specimens may be sent to a county or state official, as your State Entomologist, or an entomologist at your State University. But make certain that the specimens sent for identification are the same species as those retained for mounting. If both are from the same raft or group of eggs, this point is automatically insured.

HISTORICAL OUTLINE

Sometimes by the happenstance of the way the particular science developed, sometimes by more recent expediency or custom, certain lines of procedure become case-hardened. The material studied by investigators and technicians trained along specialized lines has thus come to fall within certain divisions, with the result that the following terminology is current:

BACTERIOLOGY embraces all types of bacteria, including such forms as *Actinomyces* and others classed as higher bacteria, and also two additional groups of uncertain relationships, the rickettsiae and the viruses. Texts of the subject frequently add chapters on the higher fungi, on protozoa, and even on certain other animals, without any justification.

MICROBIOLOGY is practically synonymous with bacteriology. It ought to mean the biology of small organisms, including such groups as diatoms and rotifers, and might even incorporate histology and cytology, but the word is used in the sense of the old term *microbe*. As an equivalent to bacteriology, the word is poorly conceived. The bacteriologists have arrogated this word to their own domain, utterly without authority, but possibly in reprisal for the sequestering of *parasitology* by the zoologist. Other biologists have let them get away with it, and the term bids fair to remain as a title.



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MYCOLOGY is the study of the fungi exclusive of bacteria. Both parasites and saprophytes are considered.

PLANT PATHOLOGY treats of all diseases of plants, from many causes, but is overwhelmingly pathogenic mycology, since the molds, mildews, rusts, smuts, and their allies are responsible for the majority of plant ailments.

PARASITOLOGY, thus stripped of all of the above, deals entirely with animals. Numerous classes of the animal kingdom contain members that have adopted the parasitic way of life, but the great majority of parasites are comprised within three major groups: protozoa, the study being termed Medical Protozoology; worms (Helminthology); and arthropods (Medical Entomology).

TROPICAL MEDICINE takes in all tropical forms pathogenic to man, be they plant or animal. This term also includes dangerous species of larger animals, as venomous snakes, such environmental conditions as heat, and the vitamin deficiency diseases. Nevertheless a textbook on this subject is largely one on parasitology, and is apt to deal especially well with the numerous and spectacular helminths of the tropics.

PATHOLOGY, when unqualified by an adjective, is always human. It is the science of disease, and includes those of whatever cause, the parasitic being but one type.

When parasitology is viewed by the ecologist, who considers himself as dealing with a broader aspect of science, the parasitic is seen as but one of several degrees of relationship between organisms. *Symbiosis* (life together) ought to include all kinds of interspecific relationship, but by priority of usage has been restricted to a condition better described as *mutualism*, wherein both creatures, each known as a *symbiont*, derive benefit and neither is harmed. The ant and aphid, man and his cattle, rhinoceros and ox pecker or tick bird, crab and anemone, flowers and their pollenizing insects, are among many well known examples.

When two organisms associate and one derives the sole benefit, but not at the other's expense, the condition is termed *commensalism* (same table; i. e., eating together at the same table). Both organisms are dubbed *commensals* or, if one is much the larger, it may be called the *host* and the other the commensal. Instances include fungus-dwelling gnats, beetles living in ant colonies, epiphytic orchids and their host trees.

A third type of such partnership is the parasitic, in which only one member, the *parasite*, benefits, and does so at the expense of the other member, the *host*. The condition is *parasitism*.

An association usually not as intimate is the relation of *predator* and *prey*. The tiger is a predacious animal and illustrates predacity, but is not limited to some other species or even group of victims for his menu. Finally, there is the condition of *independence*, in which there is no association, as between a horse and an oak tree, or a skylark and an oyster.

These points are detailed in order to note the important fact that there are no hard and fast lines drawn between these groups; they are artificial human concepts that grade one into another. For example, is a mosquito, as *Anopheles quadrimaculatus*, to be considered as a parasite or a predator of man? It attacks man in order to secure a blood meal, and the case is not one whit different than when a tiger attacks man for purposes of satisfying the inner tiger. Yet should the mosquito be infected with malarial organisms and transmit these to his unwitting host, we would then doubtless consider the insect as a parasite. If so, then a rabid tiger that bites a man who recovers from the bite but dies from rabies, is a parasite. But of course we do not employ the term in any such fashion. Actually, then, all external parasites, as fleas, lice, ticks, mosquitoes and other bloodsuckers, are predators and we only call them parasites when they are so small as to come within the category of pests or vermin. Technically, they are *ectoparasites*.

Internal or *endoparasites* are more obviously exponents of the parasitic life, yet they too are attacking us for purposes of masticating such portions of our anatomy as come to hand, and here again there is no basic difference between an ascarid worm and a tiger. The parasitic is one of the most certain and insidious methods of attack by a predator.

REVIEWS

Neurology

For some time we have felt that there must be considerable need for a smaller and simpler book than the usual text dealing with the architecture of the nervous system. For the first time there is now available a volume on this highly intricate and specialized subject than can be read with understanding and pleasure by the undergraduate biological student, the psychology major, and the general reader: *Fundamentals of Neurology*, by Ernest Gardner, of the Wayne University College of Medicine, Detroit.

Keeping in mind the limitations of most prospective readers, the author has laid down an excellent background of basic facts and principles in anatomy, histology, development, and general physiology. One of them passes to clear and concise surveys of such advanced topics as the motor, the sensory, and the associative functions of the cerebral cortex. Numerous clinical examples aid the explanations and add greatly to the interest. A novel feature is the appearance of one to several brief biographies at the end of each chapter.

Of great importance for understanding and enjoyment of the work are the splendid illustrations, which are new and well designed; they consist of diagrams, drawings, photographs, and photomicrographs that are models of clarity and precision. Anyone interested in the nervous system will want to own this excellent book. Pp. xi, 336; figs. 134. W. B. Saunders Co., West Washington Square, Philadelphia 5, 1947. $4.75.

Ornithology

A "naturalist's tour at the Government's expense" describes how *Wing to Wing* came to be written by E. H. Ware, while serving as a wireless mechanic with the RAF. This beautifully written and illustrated book tells how the author improved his leisure hours as his outfit moved from Essex to North Africa to Sardinia and Corsica, with personal trips during leaves to other parts of the British Isles. The tale is that of an amateur ornithologist and nature enthusiast who anticipates that his enforced employment as an amateur soldier will take him far from bird-watching pursuits, then unexpectedly and delightedly finds that his opportunities along this line have been increased.

The author writes with an infectious enthusiasm. If the reader has any acquaintance with or love for nature rambles he will feel as if he, too, were present and sharing in the thrills of observing both rare and common birds. There are twenty-six pen-and-ink drawings by Roland Green and a like number of photographs by the author, both sets very well done and adding to the reader's pleasure. Pp. 159. Harper and Brothers, 49 E. 33d St., New York 16, 1946. $2.75.

Anatomy

In the revision of Professor Harold M. Messer's *An Introduction to Vertebrate Anatomy*, a text for a one-semester course in comparative anatomy, new material has been added to the extent that the revision is about ten percent larger than the original. The author has added entirely new subjects, revised all parts, and examined especially a number of statements on homologies that have become an ingrained part of the subject through long and repetitious use, but which have recently been called to account, having failed to stand up under the scrutiny of detailed modern researches. The illustrations have likewise undergone revision.

This is a very complete and useful book for the briefer course. It is well written, clear, to the point, and the illustrations are modern and mostly very good. The several chapters deal with topography, characteristics of chordates, protochordates, vertebrate taxonomy, development, then an exposition of the systems of organs, concluding with the origin and evolution of the vertebrates. There are a bibliography, glossary, and index. Pp. xx, 475. The Macmillan Co., 60 Fifth Ave., New York 11, 1947. $4.75.